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Dust Control in Rock Drilling*

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THE importance of silicosis as an occupational disease has been demonstrated in many industries. Such investigations have shown rock drilling in hard-rock mining and other drilling operations to be hazardous, even including open drilling in quarries, road construction, and building excavation. It is recognized, however, that the silicosis hazard among drill operators, as in other dusty operations, varies widely with the free silica content of the rock and with the degree to which the operation is confined.

Because of the extensive rock excavation work in New York State the control of silicosis among drillers and associated workers is regarded as a most important health problem. For this reason considerable effort has been directed toward its solution. An important step in this connection was the development of a code of dust control requirements for rock drilling.[1] Since it was to apply to all drilling operations, in rocks varying widely in their free silica content and with the degree of confinement, ranging from none to complete enclosure, it was essential that the requirements of the code be related properly to the varying silicosis hazard. This was done by providing two standards of permissible dust concentration, one for drilling in high silica rocks (Class II) and the other for operations in rock containing a low percentage of quartz (Class I), as follows:

Class of Rock	*Free Silica Content Per Cent*	*Max. allowable dust concentration, million per cu. ft.*
I	Less than 10	100
II	10 or greater *	10

* Also rocks having a variable and unpredictable free silica content.

It will be observed that this limited classification departs from the generally assumed inverse relationship between the percentage of free silica and the permissible dust concentration,[2] in that only two standards are recognized rather than a sliding scale of permissible dustiness.

The use of only two standards simplifies the code, but a more fundamental

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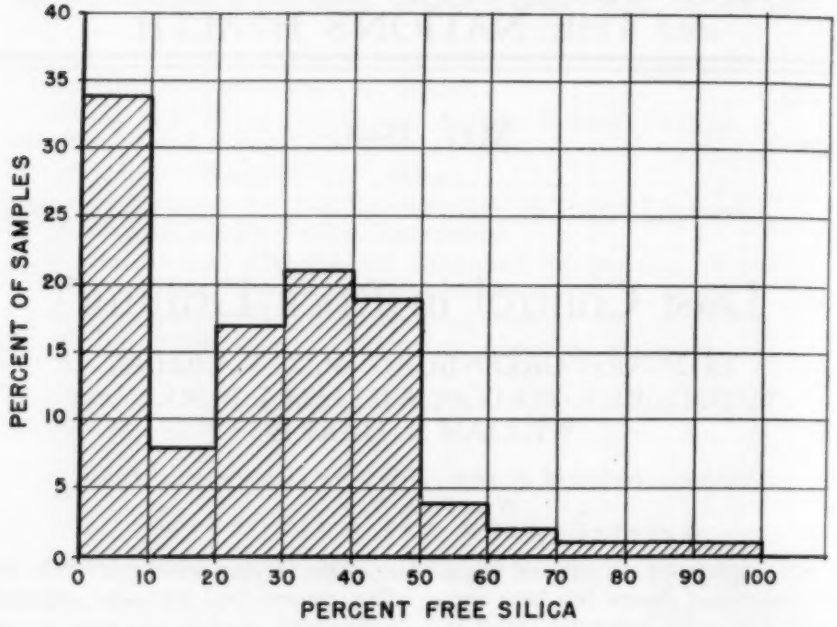
FIGURE 1—Distribution of rock samples according to the free silica content



reason for thus classifying rocks lies in the fact that the rock formations in New York State are naturally divided into two groups: (1) those moderately high in free silica or having a highly variable silica content, and (2) those having a free silica percentage below 10. This is shown in Figure 1 by the distribution according to quartz content of more than 600 rock samples collected throughout the state. One notes a reasonable separation of the samples into two groups with the dividing line between 10 and 20 per cent.

The two allowable dust concentrations of 10 and 100 million particles per cu. ft. also provide a reasonable basis for determining the dust control requirements in relation to the degree of confinement of the rock drilling operations. A concentration of 100 million is generally exceeded during uncontrolled dry drilling in underground areas. In the case of surface drilling, however, the concentration varies widely with direction and velocity of the wind, amount of protection at the drill, etc., and for certain operations, particularly

TABLE 1

Dust Concentration—Uncontrolled Open Drilling

Operation	*Type of Drill*	*Nature of Work*	*Dust Concentration, m.p.p.c.f.*		
			Min.	*Max.*	*Aver.**
Building excavation	Sinker	Open	16	147	53
Building excavation	Sinker	Open cut	17	472	133
Building excavation	Wagon	Open	9	300	70
Building excavation	Wagon	Open cut	20	74	40†
Quarry	Sinker	Open ledge	15	95	44
Quarry	Sinker	Block hole	1	178	51
Quarry	Wagon	Open ledge	4	132	28
Quarry	Drifter	Foot of the ledge	24	79	50

* These averages based upon number of tests in each case. More than 200 samples total.
† Low counts owing to wet rock.

in Class I rock, one may question the need for dust control. Dust concentration data for surface drilling under many different conditions[3] have been assembled in Table 1. The level of dustiness, it will be observed, is well above 10 million but generally below 100 million particles per cu. ft. Under the code, therefore, dust control means are required for all underground drilling operations regardless of the free silica content of the rock and for all surface drilling in Class II rock. The data show that unconfined dry drilling in Class I is permissible, however, without special control measures, since the average concentration does not reach 100 million particles per cu. ft.

ROCK SAMPLING AND ANALYSIS

It is clear from the foregoing that the proper classification of rocks from the various drilling operations constitutes an important part of the code administration, and because of the wide variation in the geological formations encountered special sampling technics are required. In one case, the operation may be confined to a single area of well defined composition whereas another may cover considerable territory within which the formations vary greatly. Every sampling procedure must therefore be outlined in advance to fit the local conditions in order to secure representative samples. Sampling methods employed by us are illustrated by the following:

Quarries — Stone quarries are frequently many acres in area with working faces as high as 200′ and may contain several different rock formations at various depths or in different sections of the quarry. In order to obtain representative samples, crushed rock is taken from the large storage piles which represent the accumulation of several months of operation and containing well mixed stone from all parts of the quarry. Grab samples are obtained from well distributed points by means of a clam shell bucket and the composite sample of about 2 tons is further mixed by raising and dropping the stone with the bucket. It is then quartered down to give a final sample of 35 lbs.[3]

Mines — Two or more samples are required from metal mines, one set representing the rock formations encountered in the development work and the other the ore being mined. In one case within our experience the development rock sample was taken from a waste dump containing about 100,000 tons which had accumulated over a period of years. This dump included materials of varying composition from different sections of the mine, and in devising the sampling procedure therefore consideration had to be given to the manner in which the waste rock pile had been formed. The rock was deposited on the dump in such a way that a horizontal section normal to the edge could be said to represent the dump as a whole. The sample was therefore taken from a series of equally spaced transverse trenches after stripping the weathered surface to a depth of 6 in. The sample of about 4 tons was crushed and quartered to give a final sample of 35 lbs.

The free silica content of the ore in this mine did not vary greatly, and a composite sample representing a week's production was therefore considered satisfactory. It was collected by an automatic sampler which removed from the main feed belt a handful of crushed ore at regular intervals.

Tunnels—In tunnel construction and general excavation work the broken rock is generally removed at once from the job and no opportunity is given to sample the material as a whole. Moreover, unlike mines, such operations are constantly moving ahead into new formations. Samples of rock are therefore taken from time to time as the work progresses, in order that we may be informed of the free silica content

of the rock throughout the duration of the job.

Analysis for Free Silica—In the laboratory the rock sample is ground to pass a 100 mesh screen and then thoroughly mixed to furnish the final sample for analysis. Knopf's procedure is followed in determining the free silica content. In the chemical analysis, however, the initial ignition is left out to avoid the danger of fusing certain constituents and rendering them relatively insoluble. A second portion is treated in the standard manner to determine total silica, after digestion in HCl, as in Knopf's technic.

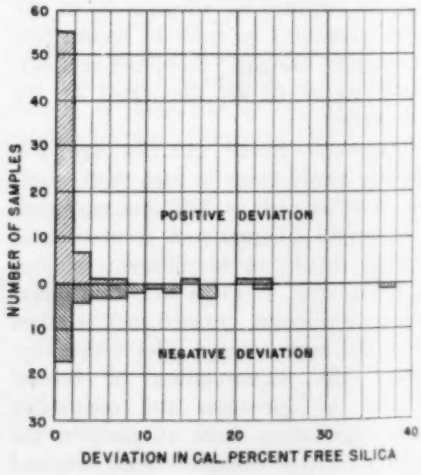
Knowing the total SiO_2 content, it is possible roughly to calculate the amount of free silica in the sample on the assumption that 50 per cent of the weight of the silicates is SiO_2 and that the material left after digestion in HCl includes only free silica and silicates. To illustrate: assume HCl — insoluble = 96.2 per cent and total silica = 66.7 per cent. The difference of 29.5 per cent represents the bases which were combined with an assumed equal amount of SiO_2 to form the silicates. Hence, the calculated free silica in the sample equals 66.7 — 29.5 or 37.2 per cent.

If the calculated and chemically determined results do not agree the sample is again studied by petrographic examination and even complete chemical analysis. There are several reasons for failure to secure agreement between the two results: (a) presence of HCl — insoluble constituents other than silicates and free silica such as insoluble oxides; (b) incorrect assumption of 50 per cent SiO_2, average, in the silicate as, for example, when feldspar is the principal silicate; (c) incomplete solution of the silicates in the hydrofluosilic acid* (d) loss of free silica by solution in the H_2SiF_6 owing to its fine particle size.

The approximate calculation is not offered as a basic procedure for determining free silica but it has been found however to provide a valuable check upon the uncertain action of the hydrofluosilicic acid and is presented for this reason. A tabulation of 104 rock analyses as depicted in Figure 2 shows that the calculated and chemically determined quantities of free silica agree within ± 2 per cent in 70 per cent of the cases with 87 per cent showing a deviation of not more than ± 5 per cent. For the most part, the very large negative deviations were associated with samples that failed to show definite endpoints for solution in H_2SiF_6. A large positive error suggests that the average SiO_2 content of the silicates present in the sample was greater than 50 per cent.

In addition to the problem of rock classification, another important technical phase of the code administration has to do with the evaluation of control measures designed to bring the dust concentration within the code requirements. In this connection, the control

FIGURE 2—Distribution of rock samples according to deviation calculated from chemically determined free silica content



* Among other silicates, talc has been found to dissolve very slowly in H_2SiF_6. We have not made use of fluoboric acid for which a more rapid solution of silicates is claimed.

problem with both dry and wet drills has been studied and the experience gained therefrom is summarized in the present paper.

DUST CONTROL WITH DRY DRILLING

The application of local exhaust ventilation to the dry rock drill provides a direct means for controlling the dust exposure of the drill operator. As with other dust exhaust systems, the apparatus required includes hoods at the drills, connected by flexible hose to a suitable source of suction and a dust collector. Unlike a permanent ventilating system in a factory, the exhaust system for rock drills must be compact and transportable to permit its being moved as the rock-drilling operations are shifted. The dust holding capacity of the collector must be sufficient to provide for at least 4 hrs. of continuous drilling at rates encountered in actual work. A highly efficient filter is required to allow for recirculation since the apparatus may be located in a confined area and the maximum filter resistance must be limited to prevent the rate of air flow from dropping dangerously between cleaning periods.

These requirements were incorporated in the procedure adopted for the testing of exhaust devices which may be briefly summarized as follows:

1. Tests to be conducted within an enclosure to eliminate the influence of natural air movement.
2. Overall rate of drilling during test: sinker, 15′ per hr.; wagon drill, 30′ per hr.; drifter, 20′ per hr.; stoper, 12′ per hr.
3. Test period: two tests of 3 hrs. each.
4. Rate of air flow through exhaust hood: at the rated capacity of the apparatus during one test and 25 per cent below the rated capacity during the other. The purpose of the test at the lower rate of flow is to demonstrate a reserve capacity for adverse operating conditions.
5. Filter resistance: The reduction in the rate of air flow during 3 hrs. of drilling, caused by the increased filter resistance, shall not exceed 15 per cent.
6. Dust storage capacity: a dust storage capacity is required for 4 hrs. of drilling, based upon the drilling rates specified above, and allowing for the increase in dust volume over the solid volume of rock removed by the drill.
7. Dust concentration: The dust concentration in the drilling enclosure and in the air discharged from the dust collector shall not exceed 10 million particles per cu. ft. during the test period.

Results of dust control studies—The results of the dust control tests in connection with dry drilling are summarized in Table 2. For the sinker and stoper satisfactory dust concentrations were

TABLE 2

Dust Concentration for Various Dry Drills with Exhaust Ventilation

Type of Drill	*Rate of Drilling ft. per hr.*	*Air Flow Through Hood c.f.m.*	*Dust Concentration m.p.p.c.f.*	
			Range	*Aver.*
2½" Sinker	16.6	40– 50	2.3–28.0	14.4
" "	21.0	50– 60	4.2–11.6	7.4
" "	16.4	60– 70	2.4– 4.4	3.0
" "	16.7	70– 80	0.2– 5.0	2.9
" "	19.7	90–100	2.4– 6.2	4.6
2½" Stoper	12.0	60– 70	1.9– 2.7	2.2
" "	9.7	70– 80	1.1– 1.7	1.4
" "	13.5	80– 90	1.1– 2.4	1.4
" "	17.8	90–100	2.3– 4.0	3.2
3½" Drifter	20.0	70– 80	0.6– 1.8	1.4
" "	24.0	80– 90	1.8– 1.9	1.9
" "	22.0	130–140	1.0– 6.3	4.4
" "	28.0	160–170	1.8– 3.9	2.7
4" Wagon drill	34.0	170–180	0.35–1.5	1.0

TABLE 3

Filter Performance in Relation to Filtering Velocity

Drill	Drilling Rate ft. per hr.	Eff. of Primary Separation	Filter Load at End of Test, lbs. per sq. ft.	Aver. Vel. of Filtration f.p.m.	Filter Resistance at End of Test	Decrease in Air Flow During Test Per cent	Dust Conc. in Filtered Air m.p.p.c.f.
Sinker	17.5	98.0	0.14	3.6	2.6 in. Hg	—	12.3
"	16.3	97.5	0.24	3.1	1.5 " "	16	0.8
Drifter	24.0	96.5	0.31	2.9	1.5 " "	16.5	0.3
Stoper	13.5	97.0	0.19	2.8	1.0 " "	10.0	0.2
Sinker	21.0	96.0	0.45	2.7	2.0 " "	20.0 (variable)	0.5
Drifter	20.0	98.0	0.22	2.5	1.0 " "	15.0	0.2
Wagon	35.0	98.5	0.35	2.2	1.3 " "	15.0	0.4
Stoper	12.0	96.0	0.12	2.2	5.4 in. H_2O	5.0 (variable)	0.4
Wagon	33.0	98.0	—	1.95	4.0 " "	Negligible	—
Sinker	19.7	9 .5	0.19	1.8	3.5 " "	"	1.9
Drifter	28.0	93.3	0.16	1.6	2.5 " "	"	0.5
Sinker	16.0	95.6	0.15	1.4	0.75 " "	"	0.5
Drifter	22.0	94.5	0.12	1.3	1.0 " "	"	0.5

obtained with a rate of air flow of 60 c.f.m. or greater. Hence, the minimum rate air flow through the exhaust hood to allow for the reserve capacity required by the test procedure is 80 c.f.m. Higher rates of ventilation will, of course, provide a still greater factor of safety. Drifter tests gave acceptable dust concentrations at rates of air flow of 70–90 c.f.m. as well as at higher rates, but subsequent experience indicated that the air flow through the hood must be at higher rates to meet field conditions involving highly irregular rock surfaces and, as a consequence, the rated capacity of the dust collector for the large bore drills (3½" and 4") should be regarded as equivalent to two small bore drills. The tests with the 4" bore wagon drill at rates of air flow through the hood of 170–180 c.f.m. gave satisfactory results.

Performance of Dust Collectors—The dust collectors employed with the rock drill exhaust systems tested included two or more stages of separation, the last stage in every case being a cloth filter. The performance data obtained during the testing of the various dust collectors are summarized in Table 3. The efficiency of primary separation averaged 96.5 per cent, ranging from 93.3 to 98.5 per cent. The velocity of filtration through the cloth filters tested varied from a high value of 3.6 f.p.m. down to 1.3 f.p.m. and the dust loading on the filter after 3 hrs. of drilling from 0.12 to 0.45 lbs. per sq. ft. of cloth. The dust concentration in the filtered air was satisfactory for all filtering velocities* and proved to be too high only at a filter resistance of 2.6" Hg. The percentage reduction in air flow resulting from increased filter resistance was within the requirement of 15 per cent for a velocity of filtration of 2.5 f.p.m. or less, and a maximum filter resistance of approximately 1.0" Hg. This is in agreement with the following theoretical calculations. Since resistance of the fixed part of the system varies directly with the square of the air flow rate, a reduction in air flow of 15 per cent decreases the resistance about 30 per cent. Thus, for a constant negative pressure at the fan inlet, the filter resistance will increase to approximately 1/3 of the total resistance when the air flow is reduced 15 per cent. The overall resistance of the dust collecting systems was found to be about 3.0" Hg. Hence, the allowable maximum filter resistance is approximately 1.0" Hg. It may be argued that such a resistance is contrary to good practice from the standpoint of

* This is in accordance with investigations which show that filter performance is independent of filtering velocity *per se*.

filter life, and also that it does not provide sufficient reserve capacity. It might be better to limit the filter resistance to, say, 6.0″ H_2O, in which case (assuming overall resistance of 3.0″ Hg.) the allowable reduction in air flow would be only 9 per cent during 3 hrs. of operation. One notes that for filtering velocities below 2.0 f.p.m., the filter resistance did not exceed 4.0″ H_2O and that there was no significant change in air flow, thus insuring constant performance and long filter life.

Dust Storage Capacity—The diameter of the drill hole commonly averages 2.0″. Hence, the volume of rock removed per ft. of depth is 0.02 cu. ft. The volume of the dust produced will be approximately double this figure, or 0.04 cu. ft. The required storage capacity for the four types of drills, operating for 4 hours at the rates specified above, will therefore be: sinker, 2.4 cu. ft.; stoper, 1.9 cu. ft.; drifter, 3.2 cu. ft.; wagon drill, 4.8 cu. ft. As a safety factor, extra storage is required and in general the storage space provided by the dust collector should be about 3.5 cu. ft. for the small drills (sinker and stoper) and 7.0 cu. ft. for the large drills (drifter and wagon drill).

Field Tests — Dust collectors have been used extensively on dry drilling operations for miscellaneous building excavation, road construction and similar work. Dust concentration data collected in the field are presented in Table 4 and for comparison, the concentrations without dust control on the same type of work are included. The reduction in dustiness is striking.

TABLE 4

Dust Concentrations for Dry Drilling with and without Exhaust Ventilation

	Average Dust Concentration			
	Without Exhaust Ventilation		*With Exhaust Ventilation*	
Type of Drill	*Open*	*Open Cut*	*Open*	*Open Cut*
Sinker	53.4	133.0	2.9	5.0 *
Wagon drill	70.4	40.0 †	1.0	

* Including counts contaminated by dust raised by nearby trucks

† Drilling in wet rock

DUST CONTROL WITH WET DRILLING

In comparison with uncontrolled dry drilling the wet drill greatly reduces dust production. The efficiency of dust control varies, however, with the design of the wet drill as indicated by investigations made on the Rand as early as 1916 [4] and more recently, by the U. S. Bureau of Mines.[5, 6] In connection with the development of regulations for the New York code, we also had the opportunity to study the dust producing characteristics of wet drills. The conclusions reached in the three investigations cited above are essentially alike and may be summarized as follows:

1. The dust concentration decreases with increasing water flow and with decreasing air flow through the drill steel.
2. Efficiency of dust control is least during collaring of the hole and increases with depth of hole.
3. Efficiency of dust control is greatest when drilling vertically down and decreases when the drill departs from this position.
4. The use of the wet drill alone, even one with the best dust control features does not provide complete dust control when operating in silicious rock in a confined area. Ventilation is required in addition to reduce the concentration below 10 million particles per cu. ft.

From the standpoint of drill design, Item 1 is of particular interest since the rates of water and air flow through the drill steel are subject to control by the drill designer. Their importance was recognized in South Africa many years ago and resulted in the development of the so-called "dustless" drill which permits little or no air flow through the drill steel and provides for a minimum rate of water flow of 1.5 g.p.m. Because of alleged inefficiency in removing cuttings from the drill hole its exclusive use for wet drilling was not recommended for the widely varying

TABLE 5

Rates of Water and Air Flow Through Wet Drills Used for Dust Control Study

			Air and Water Flow Through Drill Steel			
			Normal Operation		Collaring Speed	
Type of Drill	*Number*	*Description of Drill*	*Air c.f.m.*	*Water g.p.m.*	*Air c.f.m.*	*Water g.p.m.*
3½" Drifter	A-1	Standard drill with exhaust piped out of mine	9.86	0.58	14.1	0.48
"	A-2	Same as A-1 except exhaust free	5.5	0.55	10.8	0.55
"	A-3	A-1 with straight-through water connection	3.5	1.55	7.7	1.35
"	B-1	Standard drill, no modifications	2.3	1.20	5.2	0.87
"	B-2	B-1 with blowing port at collaring-speed plugged	2.3	1.20	1.03	1.20
"	B-3	B-1 with blowing port at collaring-speed plugged and straight-through water connection	1.87	1.88	1.0	1.90
"	B-4	B-1 with straight through water connection	1.67	1.88	3.3	1.82
"	B-5	Same as B-3 except 80 lbs. water pressure	1.6	2.28	0.8	2.24
2⅝" jack hammer	C-1	Standard drill	1.74	0.90	1.3	1.03
"	D-1	Standard drill	1.0	0.84	0.98	0.84

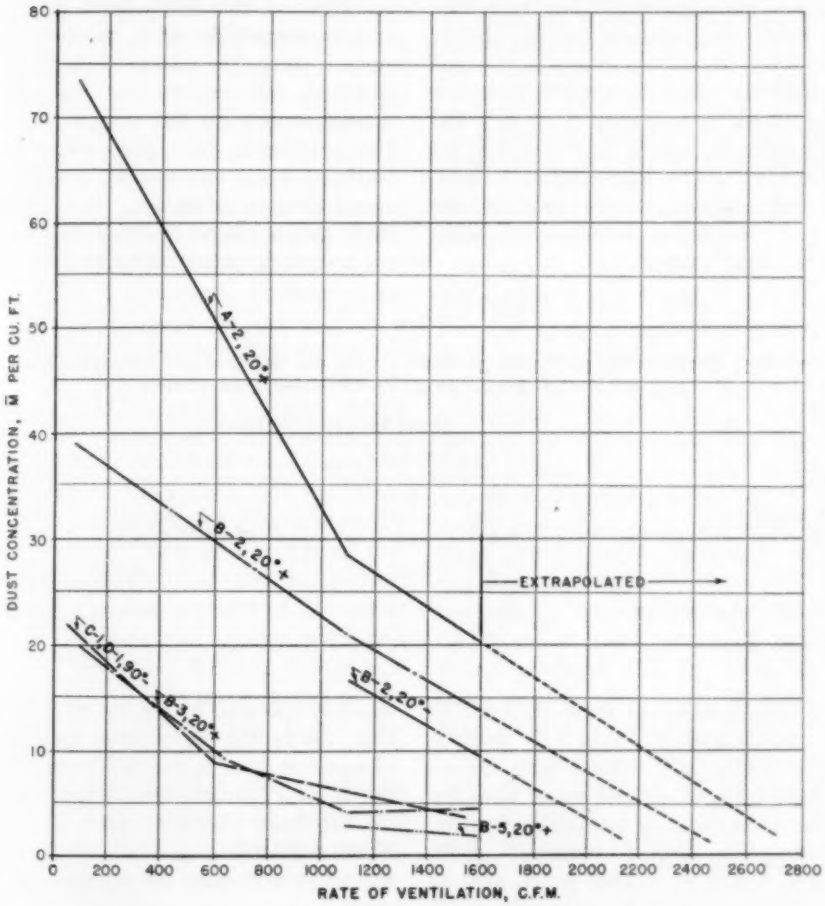
TABLE 6

Effect of Air and Water Flow Through Drill Steel and Rate of Ventilation Upon Efficiency of Dust Control in Wet Drilling

			Air and Water Flow Through Drill Steel							
			Normal Operation		Collaring Speed		Drilling Speed			
Number of Samples	*Drill Number*	*Drill Position*	*Air c.f.m.*	*Water g.p.m.*	*Air c.f.m.*	*Water g.p.m.*	*Penetration in./min.*	*Over-all ft./hr.*	*Rate of Vent. c.f.m.**	*Dust Conc. m.p.p.c.f.*
			A-2, 20° above horizontal							
3	A-2	20°+	5.5	0.55	10.8	0.55	11.3	31.0	200	73.0
2	A-2	20°+	5.5	0.55	10.8	0.55	9.7	32.0	800	47.0
5	A-2	20°+	5.5	0.55	10.8	0.55	11.9	32.7	1,200	27.0
9	A-2	20°+	5.5	0.55	10.8	0.55	10.8	32.8	1,700	20.0
			B-2, 20° above horizontal							
4	B-2	20°+	2.3	1.2	5.2	1.20	14.8	38.1	180	39.0
2	B-2	20°+	2.3	1.2	5.2	1.20	13.1	35.0	1,180	21.0
2	B-2	20°+	2.3	1.2	5.2	1.20	14.6	43.0	1,680	14.0
			B-2, 20° below horizontal							
3	B-2	20°—	2.3	1.2	1.03	1.20	12.8	26.8	180	21.0
2	B-2	20°—	2.3	1.2	1.03	1.20	11.4	34.2	1,180	17.0
2	B-2	20°—	2.3	1.2	1.03	1.20	11.7	25.3	1,680	9.5
			B-3, 20° above horizontal							
3	B-3	20°+	1.87	1.88	1.0	1.90	12.6	23.5	180	20.0
2	B-3	20°+	1.87	1.88	1.0	1.90	14.3	39.0	730	9.2
2	B-3	20°+	1.87	1.88	1.0	1.90	11.2	—	1,180	4.2
4	B-3	20°+	1.87	1.88	1.0	1.90	12.4	30.0	1,680	4.6
2	B-3	20°—	1.87	1.88	1.0	1.90	10.3	31.0	1,680	9.5
			B-5, 20° above horizontal							
2	B-5	20°+	1.6	2.28	0.8	2.35	13.5	41.6	1,680	2.9
2	B-5	20°+	1.6	2.28	0.8	2.35	12.1	36.4	1,680	1.9
			Sinker — vertical							
3	C-1	90°—	1.74	0.90	1.30	1.03	4.5	16.7	100	22.0
2	D-1	90°—	1.00	0.85	0.98	0.84	5.7	23.5	550	9.0
2	D-1	90°—	1.00	0.85	0.98	0.84	5.9	17.9	1,500	3.8

* Including air discharged by the drill.

FIGURE 3—Relation between dust concentration and rate of ventilation for wet drills having different rates of air and water flow through the drill steel



operating conditions in New York. Instead, it was proposed to allow for the use of all modern types of drills properly classified into groups according to the rates of air and water flow through the drill steel and then to establish the minimum rates of ventilation required with each group in order to attain the specified dust control. Accordingly, our investigation was undertaken to establish this relationship.

Experimental — Eleven drills were used during the tests (listed in Table 5) which provided for a wide variation in the rates of water and air flow through the drill steel. The relation between the efficiency of dust control and the rates of air and water flow is shown for these drills in Table 6. A marked reduction in dustiness was obtained, it will be noted, by increasing the water flow and decreasing the air flow through the drill steel. In the case of drill B–3, for example, the dust concentration was found to be only 20 million as compared with 73 million for drill A–2 under the same operating conditions.

The beneficial effect of introducing clean air continuously into the drilling zone is also shown in Table 6 and in

Figure 3. Because of the limited capacity of the experimental fan the dilution was not sufficiently great to reduce the dust concentration in the drifter tests below 10 million except in the case of drills B–3 and B–5 which gave low rates of air flow (below 2 c.f.m.) and high rates of water flow (above 1.5 g.p.m.). For the less efficient* drills, the extrapolated curves indicate the rate of ventilation required for satisfactory dust control.

Wet Collaring—Collaring holes without turning on the water produces great quantities of dust for a short time and is not compatible with effective dust control since the rates of ventilation provided for above are not great enough to care for the extra dust load. The practice is, to a large extent, the result of habit and can be greatly reduced through education. It is a relatively simple matter however, to provide an automatic water valve on the drill which is operated by the air throttle and thus insure the immediate application of water as soon as the drill starts. The use of such combination air-water throttle has been required under the New York regulations, and all of the drill manufacturers have so equipped their drills.

TABLE 7

Classification of Wet Drills in Terms of Rates of Air and Water Flow Through Drill Steel and Ventilation Requirements for Effective Dust Control

		Air and Water Flow Through Drill Steel				
		Normal Operation		Collaring Speed		Minimum Rate of Ventilation for One Drill
Type of Drill	Class of Drill	Air c.f.m.	Water g.p.m.	Air c.f.m.	Water g.p.m.	c.f.m.
Drifter and Wagon drill	I	4–6	0.5 –0.75	5–12	0.5 –0.75	2,500
	II	2–4	0.75–1.5	2– 5	0.75–1.5	2,000
3½" and 4" bore maximum	III	0–2	1.5 and over	0– 2	1.5 and over	1,200
Sinker 2⅜" bore, maximum	—	2.0, max.	0.75, min.	1.0, max.	1.75, min.	500

A consideration of these data led to the classification in Table 7 for drifters, wagon drills, and sinkers with respect to their rates of air and water flow and to the accompanying ventilation requirements. For drifter mounted drills, groups I and II include practically all machines that were commercially available prior to these tests, whereas, to meet the requirements of Group III, certain drills had to be modified, as for example, by enlarging the bore of water tubes, reducing clearances between moving parts and eliminating certain air passages through the drill which allowed excessive air flow into the chuck chamber. Thus, while no limitation has been put on the use of old types of wet drills, great emphasis has been placed upon their poor characteristics with respect to dust control.

APPLICATION OF VENTILATION WITH WET DRILLING

The dust concentration developed during wet drilling, even in a confined space, does not generally reach 100 million, and no mechanical ventilation is required for dust control in conjunction with wet drills operating in Class I rock. Furthermore, in the case of open drilling, the ventilation established by natural air movement is usually sufficient to reduce the dust concentration associated with wet drills below 10 million particles per cu. ft. Hence, the

* Efficiency of dust control.

need for mechanical ventilation in connection with wet drilling is practically limited to operations in Class II rock in underground or other confined areas. The manner of introducing the required ventilation will vary from one job to another and is governed by consideration of other functions of the ventilating system in addition to dust control during drilling, such as removal of natural and blasting gases, dust control during mucking, control of fog, and the maintenance of comfortable working conditions. The ventilation problem in a mine with numerous drifts, raises and other drilling areas is quite different from the problem in a tunnel having only two headings. The ventilation system is much more complicated in mines than in tunnels but in the latter, work is carried on with greater intensity and progresses at a greater rate so that the ventilating system must be extended regularly. As an example of the ventilation problem in connection with underground wet drilling, the experience gained in the construction of the Delaware Aqueduct has been summarized below.

Three methods of tunnel ventilation are available, all of which have been employed successfully for dust control on the Aqueduct.*

1. Blowing outside air toward the face from a vent pipe which extends back to a blower fan mounted on the surface. The end of the vent pipe must be kept close enough to the face to insure an effective circulation of air through the drilling zone. A modification of this system consists in direct blowing from a main vent pipe terminating beyond its effective distance from the face and providing in addition an auxiliary exhaust system to draw air direct from the face and discharge it into the tunnel at such a point that the two streams do not mix.

2. Exhausting air direct from the face and conveying it through the vent pipe to the surface. In a modification of this, the main exhaust pipe may terminate back from the face with an auxiliary blower used to pick up clean incoming air in the tunnel and discharge it across the face.

3. Exhausting air from the face and discharging it immediately through a suitable air-cleaning apparatus for recirculation in the heading. The recirculating system provides no general tunnel ventilation and consequently a primary system for this purpose is required in addition.

Ventilation by Direct Blowing — In the case of direct blowing, which is the simplest kind of ventilating system, the dust concentration obtained at the face depends upon three factors: the rate of ventilation in relation to the number of drills in use, the distance from the vent pipe to the face, and the degree to which the face is obstructed by platforms and other parts of the drill carriage. The number of drills in use on the Aqueduct varies from 5 to 9, and the rate of ventilation from 10,000 to 14,000 c.f.m., thus providing a ventilating rate per drill in excess of the minimum of 1,200 c.f.m. for Class III drills. The rough tunnel diameter varies from 26′ to 17′ approximately, and the vent pipe is either 26″ or 28″ diameter, thus giving an outlet velocity of approximately 2,500 f.p.m.

The relation between the dust concentration and the distance from the vent pipe to the face is shown for simple blowing in Table 8 and in Figure 4. According to these data, the dust concentration is reduced below 10 million when the vent pipe is terminated at a distance less than 100′ from the face.* This is not to be considered as a general recommendation. For other tunnel sizes, number of drills, and other difference in operating condition, the maximum permissible distance may be more or less than 100′.

* The present discussion has to do only with the problem of dust control during drilling and does not consider the other functions of tunnel ventilation which may be of greater importance in determining the method of ventilation to be used.

* No correction was made in these data for the dust concentration in the incoming air which probably averaged 2 million.

The problem of insuring effective circulation across the face with direct blowing is complicated by the fact that the operating platforms on the drill carriage are brought as close as possible to the rock face as a safety measure. The use of open grille platforms, while insuring the desired air movement across the face, has not been highly successful from the standpoint of maintenance. Best results have been obtained by locating the vent pipe at the spring line of the tunnel rather than at the crown, so that the circulation at the face is in a horizontal direction and is therefore not obstructed by the horizontal platforms.

TABLE 8

Dust Control by Wet Drilling Plus Ventilation by Direct Blowing

Dust Conc. in Relation to Distance of Vent Pipe from Heading

Rate of Ventilation = 1,500 to 2,000 c.f.m. per Drill

Distance of Vent Pipe from Face	Dust Concentration, m.p.p.c.f.	
	Range	Mdn.
50– 59	5– 7	6.0
60– 69	4–10	8.0
70– 79	11–15	11.0
80– 89	6–11	8.0
90– 99	4–14	7.0
100–109		
110–119	5–16	8.0
120–129	6–18	12.0
130–139	8–20	11.5
140–149		
150–159	6–27	8.0
160–169		
170–179	13–20	17.5
180–189	16–84	24.0
190–199	6– 8	7.0
200–209		10.0
>209	11–30	17.0

Some doubt has been expressed as to the practicability of bringing the vent pipe as close as 100′ from the face, owing to the possible damage from flying rock during blasting. Little or no trouble has been experienced in this connection, but in certain sections of the Aqueduct an auxiliary exhaust fan is mounted on the drill carriage which discharges through flexible vent tube to a point approximately 75′ from the face and diametrically opposite the main vent pipe. The effect of this is to insure active ventilation at the face when the end of the vent pipe is more than 100′ away. As shown in Table 9, the use of the auxiliary system produces satisfactory dust control when the main vent pipe is as much as 150′ from the face.

TABLE 9

Dust Control by Wet Drilling Plus Ventilation by Blowing and Auxiliary Exhaust Ventilation

Dust Conc. in Relation to Distance of Vent Pipe from Heading

Rate of Primary Ventilation = 1,500 to 2,000 c.f.m. per Drill

Rate of Auxiliary Ventilation = 1,500 to 2,000 c.f.m. per Drill

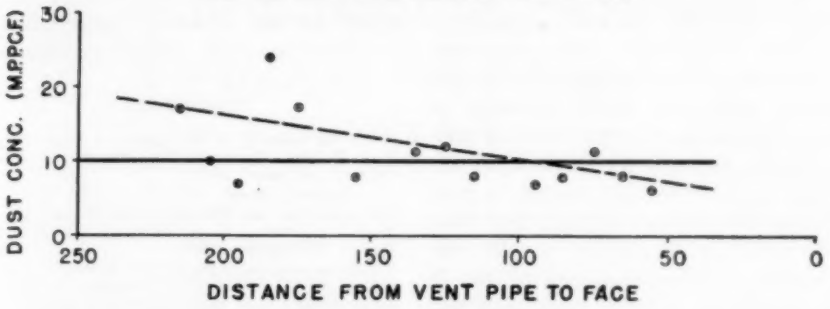
Distance of Vent Pipe from Face ft.	Dust Concentration, m.p.p.c.f.	
	Range	Mdn.
70– 79	9–11	10.0
90– 99	5–13	8.5
100–109	11–13	12.0
120–129	7–15	9.0
140–149	7–14	10.0
150–159	5–10	7.0
200–209	12–14	14.0

Ventilation by direct blowing forces the air from the face back through the tunnel and hence carries all of the dust released by the drills with it. It is evident, however, that the dust concentration will be highest at the face since the reduction in dustiness is brought about by dilution. The average dust concentration in the general tunnel air with direct blowing was found to be 5 million particles per cu. ft. with a maximum of 6 million.*

Ventilation by Recirculation — The use of air-cleaning equipment in conjunction with exhaust ventilation at the face to allow for the immediate recircu-

* In one section through dry shale, enormous dust concentrations are produced by blasting. This dust gathers in the vent pipe during the period of exhausting following the blast and is returned to the tunnel air when the fan is reversed to blowing, particularly during cold weather when the air delivered underground is dry. Continuous exhaust ventilation is therefore employed to avoid general contamination of the tunnel air.

FIGURE 4—Relation between dust concentration in heading and distance of vent pipe from the face. Ventilation by direct blowing.



lation of the ventilating air is employed on several sections of the Aqueduct. The apparatus, which is installed on the drill carriage, includes one or two exhaust inlets at the front end of the drill carriage connected in one case to a Rotoclone, followed by filters treated to withstand moisture. The function of the Rotoclone is twofold: it serves as an exhaust fan and also precipitates water droplets and some of the dust from the incoming air so as to decrease the load on the filters and thus increase their life. Another recirculating apparatus employed consists simply in a disc fan connected to suitable inlets and discharging through a 4 mesh screen.

The air-cleaning efficiency of the recirculating equipment as well as the rate of air flow must be high enough to reduce the dust concentration in the working area to the required level.

Dust concentrations obtained through the use of the recirculating equipment are given in Table 10. It is interesting to note that when filters are used, the rate of ventilation per drill through the recirculating apparatus may be lower than that required with direct blowing. This is explained by the fact that direct exhaust from the face permits more effective use of the ventilating air; that is, all of the air travels across the face whereas in direct blowing with the vent pipe as much as 100' from the face, some of the ventilating air does not even reach the drilling zone. The efficiency of air cleaning in the simpler recirculating apparatus is not as high as that provided by the Rotoclone and filter and for this reason a higher rate of ventilation is required per drill for effective dust control. Dust is apparently removed with the fog droplets which collect on the wire screen and are also thrown out by the fan itself. The apparatus is simple and inexpensive to construct and operate.

TABLE 10

Dust Control by Wet Drilling and Recirculating Ventilation

Distance Vent. Pipe from Face ft.	*Primary Vent. Cap. c.f.m.*	*Recirculating Vent. Cap.*	*No. Drills*	*Dust Conc.*		*Remarks*
				Range	*Mdn.*	
150	5,000	4,000	5	3– 6	4	Rotoclone and filters
170	6,000	4,000	5	9–13	10	Filters damaged
170	12,000	6,000	6	13–14	14	No filters
80–150	10,000 *	10,000	6	3–10	6	Fan and screen only no filter

* Primary ventilation by blowing or exhausting

SUMMARY

The silicosis hazard is well recognized among rock drill operators working in hard-rock containing a high percentage of free silica. It is regarded as an important industrial health problem in New York State, with its extensive rock excavation operations. Control of the hazard is provided for through a rock drilling code which requires that dust concentrations be reduced to 100 million and 10 million particles per cu. ft. for operations in rocks containing less than and greater than 10 per cent free silica, respectively. Certain technical problems in connection with the administration of this code are considered in the present paper, including the sampling and classification of rocks, the dust control requirements for dry drilling and the drill design and ventilation requirements for use with wet drills, as illustrated by the experience gained in the construction of the Delaware Aqueduct.

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Automatic Control of Pasteurization Advantages and Safeguards*

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MILK pastuerizers may be classified into two broad categories. The most common is the manual vat type into which the raw milk is received cold or partially heated, then heated in the vat to the pasteurization temperature, held at or above that temperature for the required 30 minutes or longer, after which the outlet valve is opened manually to discharge the milk to the cooler and thence to the bottler. The second type is the automatic or continuous-flow pasteurizer into which the milk is received already heated to the pasteurization temperature and is held automatically for the required length of time before it is automatically discharged to the cooler and thence to the bottler. The two types of pasteurization differ from each other in much the same way as the custom-manufacture of automobiles in the "horse and buggy days" differed from the continuous-flow assembly line of the modern mass-production plant.

Automatic or continuous-flow systems may employ three different types of holders for automatically holding the milk for the required length of time. One type consists of a battery of vats equipped with power-operated inlet and outlet valves the opening and closing of which are regulated by an automatic timing mechanism. After the milk is heated to slightly above the pasteurization temperature in the thermostatically controlled heater, it enters the vat whose inlet valve happens to be open. This inlet valve remains open for a predetermined period and, just before it closes, the inlet valve of the second vat opens to permit filling of the latter. This procedure continues until all vats in the battery have been filled, after which the cycle begins anew. In the meanwhile, however, the outlet valve on the first vat has opened automatically to discharge the vat contents, 30 minutes after the first inlet valve had closed. The outlet valves on the other vats follow a similar timing. The result is that during operation one vat is being filled and one vat is being emptied while the remaining vats of the battery are at different stages of holding.

Another design of automatic holder is the pocket type, which consists of a tank partitioned off into a number of separate pockets. The cycle of filling, holding, and emptying the pockets is similar to that of a battery of vats. However, pocket type holders are usually equipped with a common inlet-valve mechanism and a common outlet-valve mechanism instead of individual inlet and outlet valves on each pocket. In some designs, indeed, both the inlet and outlet valves are integral in one assembly, and either the valve or the holder revolves at a predetermined speed to complete the cycle. Filling or emptying or both may be accomplished in both pocket holders and in a battery of vats by suction or compressed air.

A third design of automatic holder consists of a tubular or equivalent stream-flow section through which the milk flows continuously during normal

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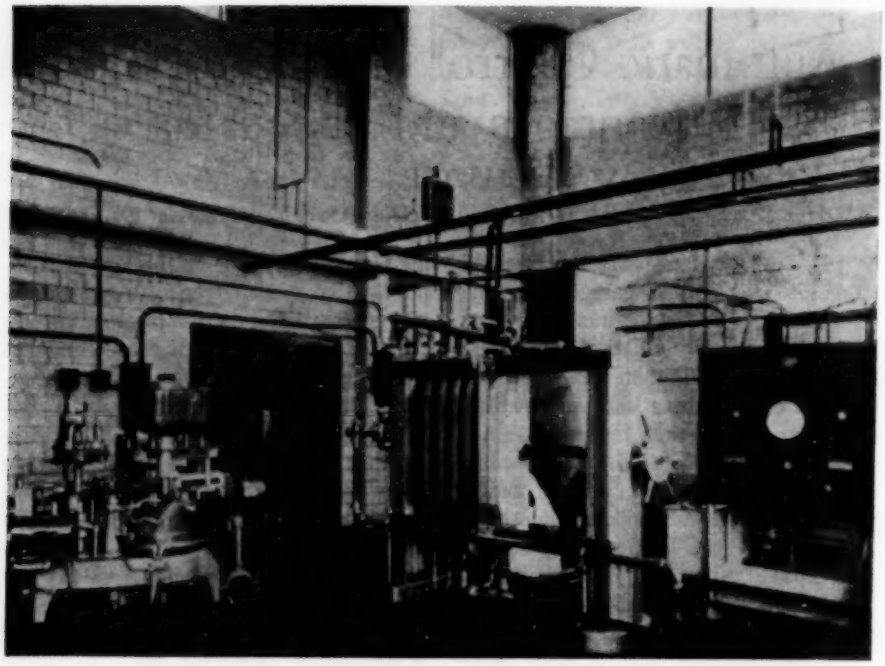


FIGURE 1—Short-time high-temperature pasteurizer

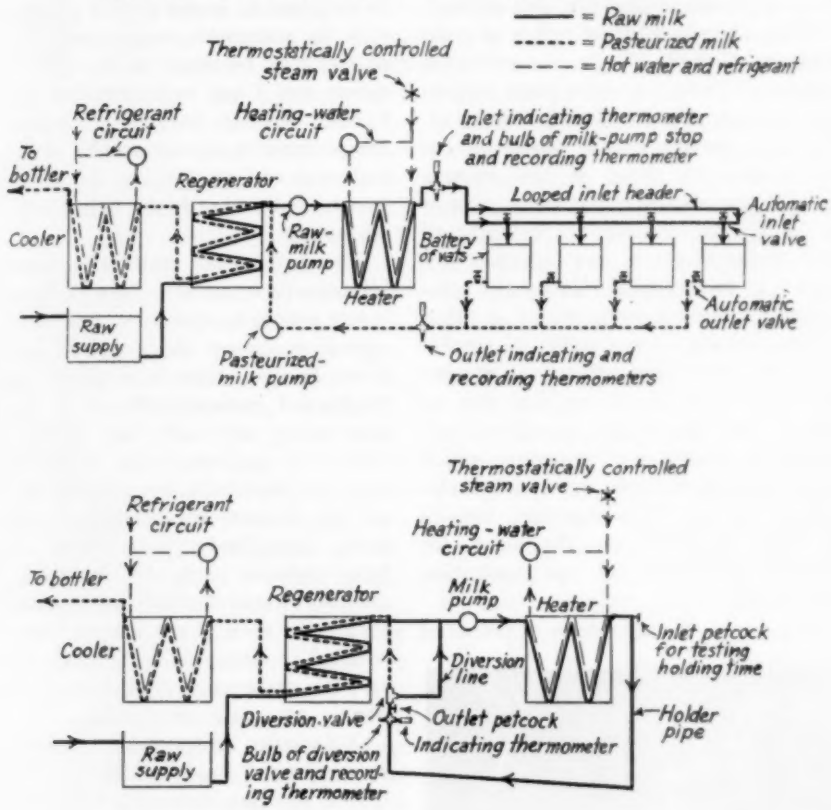
operation. In this design the speed of the milk pump is so set that the shortest time in which any particle of milk can traverse the holding section is greater than the required holding period. As in the other automatic types, the milk is heated to above the pasteurization temperature before entering the holding section. The tubular holder is generally employed in high-temperature short-time pasteurization; and while it is still being used in one model of 30 minute pasteurizer, further production of this model has been discontinued (Figure 1).

Automatic pasteurization equipment is coming into more general use in the larger milk plants because of its greater economy in space, labor, and the amount of equipment requiring cleaning. This economy is particularly noticeable in the case of high-temperature short-time pasteurizers. When a milk plant's business reaches the capacity of its building it is faced with the alternatives of erecting costly additions or of substituting automatic equipment in place of existing vat-type pasteurizers. An example of this was observed in one plant which installed high-temperature short-time equipment of greater capacity but occupying less than one-fourth the floor space of the original equipment.

Another advantage of automatic equipment from the operator's viewpoint is the ability to employ regenerators, or heat exchangers, in which a continuous flow of hot pasteurized milk on one side of a metal partition warms the incoming cold raw milk on the other side, with a substantial saving in both heating and refrigeration costs. Since efficient heat exchange requires a continuous flow of milk in both directions, manual pasteurization does not readily lend itself to regeneration.

Prior to the recent development of

FIGURE 2—Flow diagrams for battery of 30 minute automatic pasteurizers, and for high-temperature short-time pasteurizer (Diagrammatic Elevation)



the phosphatase test for determining the efficiency of pasteurization, the manual vat pasteurizer was generally believed to give more reliable results than the automatic types. This opinion was based on the fact that in the case of manual vat pasteurization it is within the power of the operator to raise the milk temperature in the vat or to prolong the holding period, if necessary, thus assuring adequate pasteurization at all times and under all conditions. Automatic pasteurization, on the other hand, was considered to be subject to the frailties of automatic devices, which sometimes broke down, thus permitting improperly pasteurized milk to flow forward to the cooler and the bottler before the operator could apply corrective measures.

Experience with the phosphatase test during the past two years has proved the fallacy of this opinion and has indicated the superior reliability of automatic over manual pasteurization. In Chicago, for example, the health authorities were astonished to find that the phosphatase test revealed frequent instances of under-pasteurization from manual equipment but only rarely from automatic equipment. We must conclude that while the safeguards that have been incorporated in automatic pasteurizers are still imperfect, they have been recently improved so as to eliminate many of their weaknesses;

but that, on the other hand, the faults inherent in the human element of manual pasteurization are still present.

While the phosphatase test is of great value as a check of the pasteurization process, it cannot replace plant inspection but can only supplement the latter. The phosphatase test is based on the inactivation by heat of the enzyme phosphatase which is naturally present in fresh milk. It will not indicate all under-pasteurization, nor whether the defect is under-pasteurization in temperature, under-pasteurization in time, or the addition of raw milk. Nevertheless, it frequently offers the health officer a clue which enables him to search for fraudulent practices and errors in design and operation which might otherwise have remained undetected. It has been valuable, too, in focusing attention on the need for trained operators of pasteurization equipment.

From the health officer's point of view the important question is: "What safeguards of design and operation must be required to insure proper pasteurization in automatic equipment?" The answer may be found in the *Milk Ordinance and Code* recommended by the Public Health Service. Because a comprehensive answer would be highly technical and too lengthy for a limited paper, only the high lights will be presented.

FIGURE 3—Flow-diversion valve

The safeguards necessary naturally fall into two classes—those designed to insure proper temperature, and those designed to insure the required holding time. In equipment from which milk is discharged automatically it is obvious that unless the milk has entered the holder at pasteurization temperature, and has been held for the full holding period, it may be discharged without being adequately pasteurized. Since large volumes may be involved, the operator would hesitate to repasteurize such milk even if the danger were discovered in time. It is therefore necessary to make such equipment as completely automatic as possible.

Automatic temperature control involves several fundamental factors. The first is accurate indicating thermometers for use during pasteurization, and accurate recording thermometers to furnish a history of the temperature between inspections. The second is a dependable thermostatic control of the milk heater to insure automatic heating to at least the required temperature. As the thermostat may occasionally get out of order or the heat source may fail, an automatic milk-flow stop is necessary to stop the forward flow of sub-temperature milk.

There are two types of automatic milk-flow stops, namely, pump stops and diversion valves. A milk-pump stop automatically shuts off the milk-pump motor whenever the milk temperature falls below the pasteurization temperature, and automatically starts the pump

when the milk again reaches that temperature. A flow-diversion valve automatically diverts the milk back to the heater whenever its temperature is too low, and automatically reëstablishes forward flow when the pasteurization temperature is again reached.

Milk-flow stops must meet certain specifications if they are to be reliable. They must be adjusted to cut in and cut out the flow of milk at the required temperature, and the proper setting should be sealed so that it cannot be lowered without the inspector's knowledge. The routine operating temperature should be sufficiently above the setting of the milk-flow stop so that the latter will not be brought into frequent operation, since with each cut-out a surge of sub-temperature milk continues its forward flow for a few seconds, even though the speed of response to milk temperature changes is as rapid as can be practicably required. Obviously, too, it should be impossible to bypass any milk around the milk-flow stop, as otherwise its purpose is defeated. The bulbs of the indicating and recording thermometers should be located as near as practicable to the bulb of the milk-flow stop so that all may react to the same temperature.

These specifications apply to both types of flow stops. In the case of milk-pump stops the following additional precautions are advisable: (1) the stop bulb should be located at some point in the milk within the influence of a heating medium, as otherwise the milk pump could not be restarted; (2) manual switches should be prohibited for milk-pump stops because they can be operated manually to establish forward flow of milk regardless of its temperature; (3) all forward gravity flow of sub-temperature milk during pump shut-downs must be prevented. In the case of flow-diversion valves special requirements are necessary to prevent sub-temperature milk from entering the forward-flow line due (1) to failure to assume the diverting position when the primary motivating power fails, or (2) to the omission or jarring loose of the clip connecting the valve seat and the actuating mechanism, or (3) to tightening the stem packing so tightly as to prevent the valve from assuming the fully diverting position, or (4) to the absence of a properly designed leak escape to prevent leakage past the seat from entering the forward-flow line during diversion, or (5) to incomplete closing of the forward-flow seat so that leakage past it exceeds the capacity of the leak-escape device.

In the case of 30 minute holders the milk-flow stop is usually located upstream from the holder, and either a pump stop or a diversion valve may be used. For 15 second pasteurizers, however, a flow-diversion valve is ordinarily employed at the downstream end of the holder section. The location of the stop and the type of stop used are governed by specifications designed automatically to safeguard the pasteurization temperature throughout the entire holding period.

When a milk-flow stop is used only upstream from the holder, various precautions should be taken to prevent any significant loss in milk temperature downstream from the stop bulb. The holder must be either insulated or equipped with automatic auxiliary heaters, and the milk must be kept mixed, so that no particle thereof will cool significantly during the holding period. Temperature loss in the milk line between the stop bulb and the holders may be avoided by providing a continuous flow in all parts thereof during operation and automatic drainage when forward flow ceases. Means should also be provided to prevent the hot milk entering the holder after a lengthy shut-down from being cooled by the cooled holder contents or metal; and to prevent the milk that may have cooled

after discharge from the holder from returning to the holder and thus cooling the incoming hot milk.

When a milk-flow stop is located only downstream from the holder, the safeguards are of a different character. The holder system must be unheated, as otherwise milk entering at sub-pasteurization temperature might thereafter be raised to the proper temperature and thus be passed by the downstream flow stop without having been held at that temperature throughout the required holding period. As no heating medium can therefore be available to start the milk pump, such a stop cannot be of the pump-stop type, but must be of the diversion type. In addition, sufficient mixing of the milk in the holder must be provided so that no portion of it is significantly colder than the remainder, as a small volume of sub-temperature milk could be passed by the flow stop, due to its thermometric lag, before it responded.

We have discussed temperature safeguards. In automatic systems the holding time must also be safeguarded. Naturally, no milk should be added to any vat or pocket after the beginning of any holding period. Pocket type holders should be so constructed that milk from one pocket cannot overflow into any other pocket, as otherwise it may be discharged from the holder without having been held for the required time. Unless tubular holders are equipped with an air vent, they should be so sloped that no air or gases can accumulate at a high point in the holder section, thereby decreasing the cross-sectional area of flow and increasing the velocity of flow so as to reduce the holding time. In the case of 30 minute tubular holders special precautions are necessary to insure the full holding time, but these will not be discussed in this paper. The maximum attainable speed of the motor and of driving gears which operate the timing device of automatic batch holders, and the speed of the milk pump in the case of tubular holders, must be such as to insure adequate holding time. If the speed is variable the proper setting of the motor governor or the drive should be officially sealed so that the holding time cannot be shortened without the inspector's knowledge.

Tests of the holding time are necessary upon installation and after any alteration that may affect the detention period. In the case of automatic vat or pocket systems the interval between the closing of the inlet valve and the opening of the outlet valve may be checked with a watch. In the case of tubular holders the holding time is determined by injecting a dye solution into a petcock located at the inlet to the holder section and accurately observing the time required for the color to appear at the outlet end.

When regenerators are employed, the raw milk must be kept at a lower pressure than the pasteurized milk (or the heat-transfer medium, as the case may be) not only during normal operation but also at the beginning of a run and during pump shut-downs. Unless the proper relative pressures are maintained the raw milk may contaminate the pasteurized product in case flaws develop in the metal or the joints seperating the two. The methods of insuring proper relative pressures cannot be discussed within the scope of this paper, but may be found in publications of the United States Public Health Service.

Brief as this outline has necessarily been, it will perhaps have served the purpose of emphasizing the highly technical nature of automatic pasteurization equipment, and the advisability of appointing milk plant inspectors who have sufficient engineering or equivalent technical training for the proper performance of their duties.

Evaluation of Cancer Control Methodology*

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THE program for cancer control in Massachusetts began as a new venture to be molded by experience and evaluated by results. Essentially it embodies the stimulation of conscious knowledge of the disease and its implications among the profession and the populace, and the supplementation of existing diagnostic and therapeutic resources. It has been tempered to a degree of sensitivity to existing needs, and has maintained its pliability for the accommodation of progressive change. The incorporation of corrections and the omissions of proved inadequacies, as revealed in the analysis of the periodic studies of each of its parts, have been the instruments in the tempering process, and the facts in this report may be considered the guides.

The sources of factual information on which the periodic checks have been based are the death rates; attendance of cancer patients at state aided cancer clinics; periods of delay between first symptoms and first visit to physician, clinic, and treatment; attendance of physicians at teaching clinics; use made by surgeons of the Tumor Diagnosis Service; and the prognosis at clinic admission. Trends from these data are shown in Table 1. The age adjusted female cancer death rate has fallen; the male rate appears stationary; the admission rate to cancer clinics has nearly tripled; the percentage of those with favorable cancer has slightly decreased; the number of physicians attending teaching clinics has increased steadily; the number of physicians sending specimens to the diagnostic service has doubled; and there has been an increase in the number of individuals going to physicians and clinics, and receiving treatment in the early stages of the disease. All these measurements point toward improvement in the program for cancer control, with the exception of the item listed as "percentage of favorable cases" which has a downward trend. All of these trends merit detailed analysis.

The age adjusted cancer death rates for males and females furnish one index of the status of the cancer problem. This index is retroactive, a more accurate picture of an earlier period in view of the 2 year lag which is created by the duration of the disease. From an administrative standpoint this is unfortunate because it necessitates delay if changes are necessary. The amenability to treatment of cancers of the breast and the uterus accounts in part for the greater improvement in the age adjusted cancer death rates among females than

* Read before the Vital Statistics Section of the American Public Health Association at the Sixty-eighth Annual Meeting in Pittsburgh, Pa., October 17, 1939.

TABLE 1

Trends of the Several Criteria of Evaluation of Cancer Control Methodology

	Average 1927–33	1934	1935	1936	1937	1938
Female cancer death rate per 100,000 population, adjusted to age	127.7	129.4	125.2	124.9	124.5	124.2
Male cancer rate per 100,000 population, adjusted, to age	95.5	107.2	99.2	105.9	102.8	106.7
Admission rate per 100,000 population of cancer patients at state aided cancer clinics	15.8	24.3	24.8	29.7	30.8	38.2
Attendance of physicians at teaching clinics	....	190	422	843	1,384	1,796
Number of surgeons using Tumor Diagnosis Service	388	513	562	610	650	702
Percentage of cancer patients going to first physician within 1 month of first symptoms	14.7	15.6	16.6	14.7	17.4	19.7
Percentage of cancer patients going to first physician within 4 months of first symptoms	44.2	45.5	45.7	50.0	48.9	50.2
Percentage of cancer patients going to clinic within 1 month of first symptoms	4.3	6.2	6.1	5.0	5.1	5.5
Percentage of cancer patients going to clinic within 4 months of first symptoms	28.3	31.4	32.9	36.5	34.8	35.1
Percentage of cancer patients receiving treatment within 1 month of first symptoms	2.9	3.3	4.0	3.1	3.0	3.4
Percentage of cancer patients receiving treatment within 4 months of first symptoms	19.6	20.4	25.2	25.9	25.5	26.5
Percentage favorable cases	39.5*	41.2	39.6	33.0	37.5	36.5

* 3 year average

among males.[1] Since 1934, when the high point of 129.4 per 100,000 population was reached among females, there has been a consistent decline in their rates. Among males, the age adjusted death rate, while still increasing, appears to be approaching a level.

The number of admissions to the state aided cancer clinics has increased progressively. The full import of this observation lies in its relationship to the amount of cancer morbidity at any moment. Among the better estimates of cancer morbidity are those of Bigelow and Lombard for Massachusetts,[2] and of Mountin, Dorn, and Boone for Atlanta, Ga.[3] These estimates are entirely different as probably are the two localities in respect to cancer. Correct reporting of cancer morbidity would be ideal, but has been proved to be impracticable in Massachusetts by Curtis and Bigelow who experimented with the idea on a voluntary basis in Newton.[4] Without a satisfactory estimate of the size of the problem, the attendance at the clinics cannot be perfectly appraised. If the death trend and morbidity trend for cancer are somewhat similar, however, the increased clinic attendance means an improvement in the situation.

The Tumor Diagnosis Service has been operating since before the inception of the complete cancer control program. Its use by surgeons is a specific index of their increasing consciousness of the possibility of cancer among their patients, and also has proved to be a mark of the effectiveness of the educational methods employed throughout the state. As rapidly as a community is organized into the Coöperative Cancer Control Program, the number of specimens suspected of malignancy from the surgeons in that community to the Tumor Diagnosis Service begins to increase.

The increased attendance of the general practitioner at the teaching clinics is another indication of a progressive attitude among the profession toward cancer.

In analyzing the trends of favorable cases and delay it is necessary to compare these data with end results, as the cases called favorable cases are opinions at best, and whether or not an interval of delay occurred between the first visit to a physician and attendance at the

clinic has no effect as a rule on either delaying or hastening the institution of therapy.

Follow-up over a long period of time is prerequisite to accurate appraisal in the study of cancer methodology since the end results of cancer cannot be obtained until years after the onset of the original lesion. New lines of therapy frequently replace original treatment during the interval. The inherent difficulties in the actual processes of long-term follow-up occasion the loss of some valuable objective research material. In culling the literature on the subject, the difficulty of comparison with reports of other authors is evident because of the infinite variety of populations upon which purported cures are based. Some are limited to favorable cases, others to favorable and operable cases, and a few are not limited but include a cross-section of all cases. Another difficulty is introduced in the criterion of measurement of favorable or operable cases among individual surgeons. Surgeons with equal operative ability may show significant differences in 5 year cures according to the particular standard of measurement employed in each case.

Not only the criterion of measurement but the actual period of measurement varied in the literature; some have used 3 years without recurrence of symptoms, others 10 years, and the great majority 5 years. Such so-called cures are far from satisfactory, as disease may be present and unrecognized at the time of examination. The British Ministry of Health [5] has used a survival rate calculating the number of years which followed operation. This is a more satisfactory statistical entity as the fact of being alive may be determined beyond question whereas there is always some uncertainty as to the actuality of cure.

The records collected from the Massachusetts state aided cancer clinics * are far more complete in respect to follow-up than most other cancer data. From the inception of the cancer clinics in 1927 through 1938, there were 11,032 individuals with cancer who came to the clinics. Of this number, 9,006 were individuals with primary cancer or cancer with metastases. Only 2.3 per cent of the clinic patients have been lost, giving a 97.7 per cent successful follow-up. The criterion of measurement used is similar to that employed by the British Ministry of Health,[5] the principal difference between the two being the point at which measurement was started. The Massachusetts data use as an origin the appearance at the state aided cancer clinic, not the moment at which treatment was instituted. This is a very slight difference because over four-fifths of those attending the Massachusetts state aided cancer clinics have treatment within 1 month.

Neither the 5 year cure nor a survival period is an accurate picture of a real cancer cure. The age of the cancer patient is such that mortality from other

* At the first visit of the patient to a cancer clinic, information is obtained by social service regarding the symptoms and their duration, the motivating cause for coming to the clinic, identifying data, age, sex, whether other doctors had been consulted, the interval since onset of symptoms that had elapsed prior to first consultation with a physician, and the interval between first consultation with a physician and consultation at clinic, and reasons for delay in seeking diagnosis. One of the physicians in charge of the clinic dictates the medical findings and the recommendations. The patient is returned to his physician and treatment is determined by this physician, and effected in some cases with and in some cases without the assistance of social service in making arrangements. The social worker follows each cancer patient, obtains hospital transcripts of operations and other therapy, and keeps in touch with the patient throughout life. If the patient moves, the record is continued by the worker in the section of the new residence. If the patient leaves the state, attempts are made to contact him through existing agencies. The majority of lost patients are those who have left the state and with whom it is impossible to establish a local contact. All these records are verified, coded, punched, and tabulated by experienced workers under the supervision of the co-author, who revised the earlier code and directed the transfer to codes of the data on the clinic forms. The procedures were not as well standardized in the early years of the cancer clinics, and the percentage of unknown items was greater than in the later years.

diseases is high and many individuals do not live a sufficient length of time to determine whether or not they have been cured of their cancer. As a check on whether the survival rate can be used as a reasonably satisfactory measure of cure, a table was constructed of the cancer clinic population from 1927 to 1937 inclusive. The percentage of cancer individuals dying each year following the clinic visit, both with cancer and without cancer, as well as the expected percentage of deaths other than cancer in the Massachusetts population starting at age 61 was computed. The mortality rates for the cancer population for those dying within 1 year of clinic admission were based on the median of 11 years, and for each subsequent year on 1 year less. On this basis, only the clinic admissions of 1 year, 1927, could have survived 11 years at this writing. Curiously enough, the percentage remaining alive at the end of 11 years was identical with what would be expected by subtracting the total death rate from 100. This indicates a similarity of the death rates year by year, and gives additional weight to the results.

The number who died with no cancer present has been reasonably consistent throughout the period. The highest rate is 2.1 and the lowest 0.4. This last figure, based on only one clinic year's experience, is naturally not so well established. Moreover, the percentage dying each year from non-cancer is less than a similar percentage constructed from the Massachusetts death tables. After 4 years the cancer death rate is below 2 per cent, and while there is a general lessening as the years progress the figures indicate that cancer patients who survive 4 years have a relatively low cancer death rate.

A survival rate of over 4 years is justified by this evidence as a relative determinant of curability. In dealing with end results in relation to the percentage of favorable cases and the various periods of delay, the clinic cancer population between 1927 and 1933 inclusive has been used. There were 1,333 individuals of the total 3,795 who attended the clinic in this period alive in July, 1938. The shortest period of survival was 4.5 years, the longest 11.5, with an average of 7.2 and a median of 6.7. For convenience, all the records of one year are centered on the midpoint. The status of cancer patients for the first 7 years as of July, 1938, is shown in Table 3.

TABLE 2

Percentage of Cancer Patients Dying at Varying Intervals After Admission to Cancer Clinics, Contrasted with Non-cancer Deaths in Massachusetts

	Mortality Rate per 100 Cancer Patients Attending State-aided Cancer Clinics, 1927–37			*Expected Deaths from Diseases Other than Cancer per 100 Population in Massachusetts Starting at Age 61 (Computed from 1931–33 Deaths)*
Dying Within:	*Total*	*Cancer Present at Time of Death*	*No Cancer Present at Time of Death*	
1st year	29.7	28.3	1.4	2.2
2nd year	11.4	10.0	1.4	2.4
3rd year	6.9	5.8	1.1	2.4
4th year	4.2	2.3	1.9	2.6
5th year	3.8	1.9	1.9	2.7
6th year	3.6	1.9	1.7	2.9
7th year	3.6	1.5	2.1	2.9
8th year	3.0	1.3	1.7	3.0
9th year	2.5	0.8	1.7	3.1
10th year	2.1	0.3	1.8	3.4
11th year	1.3	0.9	0.4	3.5
Total dead at 11 years	72.1	55.0	17.1	
Alive at 11 years	27.9			
Grand Total	100.0			

TABLE 3

Status as of July, 1938, of Cancer Patients in Attendance at Massachusetts State Aided Cancer Clinics, 1927–1933

Years After Clinic Admission	Living	Dead	Unknown	Total
11	67	173	6	246
10	143	290	22	455
9	126	295	30	451
8	180	342	22	544
7	195	365	23	583
6	273	428	11	712
5	349	430	25	804
Total	1,333	2,323	139	3,795

The physician indicates whether or not in his opinion a clinic patient may be cured under the item "favorable case." An increase in the percentage of favorable cases would show an increased attendance of patients with early cancers of curable sites. If the judgment of physicians and the sites of cancer were constant, the term "favorable case" would measure actual progress or retrogression. The variability in these two items makes this index of fluctuating significance.

A perusal of the records shows that the percentage of cancers of accessible sites has varied considerably over the period studied. In the later years there has been an increase in the clinics in the number of inaccessible cancers, with a resultant decrease in the percentage that could be considered favorable. Table 4 demonstrates the increased percentage of individuals with cancer of the digestive and respiratory tracts, where the percentage of cures is low. This shows that the program is reaching a greater cross-section of cancer patients. It also stresses the inherent difficulty in anticipating a favorable prognosis.

TABLE 4

Increase in Percentage of Individuals with Cancer of the Digestive and Respiratory Tracts

Massachusetts State Aided Cancer Clinics

Year	Per cent
1927–1933 Average	12.1
1934	13.0
1935	16.6
1936	17.1
1937	17.4
1938	18.7

The prognostic ability of the clinic physicians has been determined by comparing the original prognosis with 4 year end results, in order to determine the presence or absence of a trend. It was impossible to obtain a larger series due to the fact that this information was not available for the early years. The 1931 prognosis was correct in 72.5 per cent of the cases; the 1934 prognosis in 76.8 per cent. This indicates a slight improvement in prognosis.

TABLE 5

Percentage Agreement of Prognosis with End Results

Massachusetts State Aided Cancer Clinics

Year	Per cent
1931	72.5
1932	75.9
1933	75.1
1934	76.8

The shortening interval of delay in each of its several aspects is one of the signs of progressive improvement. The responsibility for these several delays falls on the individual alone in one case, on the individual and his physician in the second case, and on the individual, the physician, and the clinic social worker in the third case. The patient himself is responsible for the length of time he delays seeking medical advice after he notices an abnormality. The patient and physician are responsible for that second interval after the visit to the physician before the attendance at the clinic. Since the individuals studied are all clinic patients, and since social service is required in every clinic, the responsibility for delayed treatment following clinic diagnosis must be shared by the social worker.

Of the 3,795 cancer patients who came to the clinics between 1927 and 1933, the percentage of unknown items varied in the different periods of delay.

The intervals of delay have been computed solely on known data (Table 6).

TABLE 6

Percentage of Unknown Items of Delay Among Individuals with Cancer in Attendance at Massachusetts State Aided Cancer Clinics, 1927–1933

Unknown as to duration between first symptom and first visit to physician	13.1
Unknown as to duration between first visit to physician and first visit to clinic	6.6
Unknown as to interval between first visit to clinic and institution of therapy	5.3
Unknown as to interval between first visit to physician and first visit to clinic	18.3

Physicians were consulted within the first month of symptoms by 14.7 per cent of the clinic patients with cancer who went to physicians prior to attendance at the clinics. About two-fifths of these same patients went to the clinic within 1 month of first visit to physician and about four-fifths of this number had treatment within 1 month of clinic consultation. Only 2.9 per cent of the cancer individuals had treatment within 1 month of first symptoms. Of this group 50.5 per cent were alive from 4.5 to 11.5 years (Table 7). The other periods of delay are not as sound an index of accomplishment since the survival rates of these groups are similar to that of total cases. If skin cases are omitted, this percentage of 50.5 would be reduced to 44.5.

TABLE 7

Survival Rates Subdivided by Periods of Delay of Individuals with Cancer in Attendance at Massachusetts State Aided Cancer Clinics, 1927–1933

	Per cent Alive
Less than 1 month delay between first symptom and first visit to physician	26.2 ± 4.0
Less than 1 month delay between first visit to physician and attendance at clinic	38.2 ± 1.4
Less than 1 month delay between first visit to clinic and institution of treatment	37.8 ± 0.9
Less than 1 month delay between first symptom and institution of treatment	50.5 ± 5.1
Total Cases	36.7 ± 0.9

A further tabulation has been done showing the percentage living by sites of cancer for those treated within 1 month of recognizable symptoms compared with those who were treated later. The results are consistently lower with the exception of cancer of the digestive tract, but chance fluctuations are so large that significance is found only in uterus and totals (Table 8).

Information is available on the reason for delay before coming to clinic of 6,933 of the 9,006 cancer individuals who attended the clinic from 1927 to 1938 inclusive. The delay in most cases is a summation of the delay before visit to first physician and between this period and attendance at clinic. A small part of the population had only the delay before clinic consultation as the first physician seen was at the clinic. The reasons for delay are given in Table 9.

TABLE 8

Survival Rates, by Sites of Cancer, of Individuals with Cancer in Attendance at Massachusetts State Aided Cancer Clinics, 1927–1933

	Per cent Living Total	*Per cent Living Patients Who Were Treated Within 1 Month of Recognizable Symptoms*	*Per cent Living Coming After Delay of Over 1 Month for Treatment*
Buccal	36.6 ± 1.9	41.2 ± 11.7	36.5 ± 2.0
Digestive Tract	5.0 ± 1.2	0.0 ± 7.3	5.2 ± 1.2
Uterus	23.6 ± 2.2	62.5 ± 10.6	21.8 ± 2.3
Breast	28.8 ± 2.1	44.0 ± 9.1	28.0 ± 2.1
Skin	57.6 ± 1.5	76.5 ± 12.0	57.5 ± 1.5
All Others	25.6 ± 2.5	80.0 ± 19.5	24.5 ± 2.4
Total	36.7 ± 0.9	50.5 ± 5.1	36.3 ± 0.9

TABLE 9

Reason for Delay Before Coming to Clinic of Individuals with Cancer in Attendance at Massachusetts State Aided Cancer Clinics, 1927–1938

	Per cent Total Cancer Population	*Per cent Patients Who Delayed*
No Delay	15.9	
Physician Advised Otherwise	21.6	25.6
Fear	2.5	2.8
Negligence and Ignorance	53.6	63.9
Economics	2.5	3.0
Miscellaneous	3.9	4.7

The large percentage of individuals who delay due to negligence emphasizes the need for further education of the public. In the group which received other advice from a physician are two types of patients—those who could be helped and those who in the opinion of their physicians were so far advanced that other than palliative treatment would be useless. Of the group that could be helped, some were delayed by physicians who made mistaken diagnoses and others by those who prescribed treatment of a dubious nature. There are no data available to separate the 21.6 per cent into these component parts. In a study of a random sample of cases in the Memorial Hospital in New York and the Lendrim Tumor Clinic in the Paterson General Hospital in New Jersey, Pack and Gallo[6] divided the responsibility for delay into three groups: patient alone, patient and physician, physician alone. They attributed 17.0 per cent to physician alone, and 18.0 per cent to physician and patient. In this study no attempt was made to make a combined classification of physician and patient, so the 21.6 per cent of this study would correspond to 35.0 per cent of their study. Moreover, they used a 3 month interval as no delay, while in the present study delay was considered as longer than 1 month. They found 20.7 per cent of their cases marked no delay contrasted with 15.9 in this study. Considering the criterion of delay used in Massachusetts and the resultant figures, it would appear that the manifest interest of the Massachusetts physicians, over half of whom are in constant contact with the Cancer Division, is apparent in these figures. It is difficult to understand why even so small a percentage as 2.5 delayed for economic reasons. Inasmuch as diagnosis is available without cost for those of limited means, the only explanation would appear to be a lack of knowledge of the availability of clinic resources. Even transportation is provided, if the individual cannot obtain it otherwise.

The period of delay between the visit to clinic and the institution of treatment has been studied in relation to the cause for delay. Here the number of unknowns is much less—7.9 per cent. The close supervision of the patients by social service is responsible for this low figure. The reasons for delay for the 8,294 individuals with information available are shown in Table 10.

TABLE 10

Reason for Delay Between Diagnosis and Treatment of Individuals with Cancer in Attendance at Massachusetts State Aided Cancer Clinics, 1927–1938

	Per cent Total Cancer Population	*Per cent Patients Who Delayed*
No Delay	64.3	
Physician Advised Otherwise	1.1	3.1
Fear	1.6	4.5
Unwilling to Accept Diagnosis	2.8	7.8
Economics	0.8	2.3
Physical Condition	2.7	7.6
Negligence	2.6	7.3
Waiting for Arrangement	21.7	60.7
Miscellaneous	2.4	6.7

The largest item deals with waiting for arrangements. Inasmuch as delay between clinic and treatment was defined as any period over 7 days, this high percentage does not seem unreasonable. In many cases individuals had to wait longer than this before they could be admitted to a hospital. A great many of the patients made use of the state cancer hospital which has a wait-

ing list practically all the time. The waiting list is so arranged that individuals with a strong probability of cure are usually admitted within a week, while some of the others wait for a longer period of time.

The items "no delay" and "physician advised otherwise" are exceedingly satisfactory when comparison is made with these same items in a study reported by Lombard and Cronin in 1929 on the earlier experience of the clinics.[7] At that time only 41.7 per cent experienced "no delay" as compared with 64.3 per cent in this study, and 11.8 per cent were "advised otherwise by physicians" as compared with 1.1 per cent in this study. One very important finding disclosed by this study is that the later manifestations of the disease are more conducive to action than are the early symptoms, and that education on this score must continue without abatement. Of individuals who went to their physicians within 1 month of their symptoms, 24.8 per cent went to the clinic almost immediately. Of individuals who delayed between 6 months and 1 year before consulting a physician, 44.8 per cent went to the clinic almost immediately. Of those individuals who delayed 1 year and longer 64.5 per cent went to the clinic immediately after consulting their physician.

Theoretically, the best method for determining the progress of the cancer control program in Massachusetts lies in the percentage of individuals having cancer in attendance at the state aided clinics who have received treatment within 1 month of symptoms. Until more early cases appear at the clinics, this figure cannot be used exclusively. At the present time it is better to use a combination of several items to measure this progress than to limit measurement to any single item.

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DISCUSSION

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TO most public health audiences, cancer is a relatively new subject. Moreover there are few major public health problems, efforts in the control of which are viewed with a more general and widespread feeling of hopelessness than cancer.

The subject is new to public health because of the limitation of its interests in the past to such traditional problems as maternal and child welfare and the infectious and communicable diseases. The feeling of helplessness in regard to a solution of the problem arises first because sufficient knowledge of fundamental causes is not available, and

second because most attempts to summarize existing knowledge into a broad philosophy of cancer encounter so many inconsistencies among the alleged facts as to create the impression that the problem is profoundly complex.

This impression as to the extreme complexity of the problem is gained from the fact that, in most particulars, cancer is a disease unto itself; that it has no counterpart anywhere in the field of medicine and public health; that it is practically universal in its occurrence; that it affects peoples of all races and social classes, both sexes, and at every age; that it involves practically every organ and tissue of not only man but lower animals; that, indeed, in many particulars, it is strikingly similar to certain abnormal conditions affecting even plant life.

Clinically, cancer is a condition characterized by an unrestricted growth of tissue, the fundamental and ultimate cause or causes of which are unknown. In this unrestricted and unlimited growth, the cancer cell, so far as can be determined, appears to be outside of range of effective influence of the physiological growth-inhibiting functions of the host organism. Generally speaking, unless destroyed by artificial means, this growth is continuous, limited only by the extent to which its nutritional requirements are met, and ceasing only with the death of the host.

However, this capacity for continued unrestrained growth is the only characteristic common to the large group of conditions we speak of as cancer. Only in its universality of occurrence and in the " immortality " of its cells is cancer a single entity.

In all other respects, *i.e.*, from the standpoint of its epidemiology, etiology (broadest sense), therapy, end results, economics, amenability to diagnosis and treatment, and administrative aspects of facilities required for its prevention and control, cancer is not a single disease, but embraces a very wide variety of conditions, indeed almost as many as there are body organs and tissues which it attacks. For example, carcinoma of the cervix and carcinoma of the lung differ in these respects as widely as gonorrhea in the female differs from pulmonary tuberculosis; carcinoma of the breast is hardly more closely related epidemiologically to carcinoma of the skin than Brill's disease to Rocky Mountain spotted fever.

Therefore it seems important to emphasize the multiple character of cancer, the full appreciation of which, in my judgment, is basic and fundamental to a reasonably sound concept of the disease and of the problem.

The present evolution of our thinking in cancer is in many respects parallel to that in relation to fevers a half century or more ago. Seventy-five years ago, the most ingenious theories and hypotheses were developed in an attempt to reconcile the then known facts about fevers into a broad philosophy of the fever problem and to devise some practicable measures for their control. This ingenuity was necessary by reason of the fact that no distinction was then made between such conditions as typhus, typhoid, the bacillary dysenteries, malaria, and perhaps others. It was not until these differentiations were made, *i.e.*, the fever problem broken down into its simpler elements, that really workable hypotheses could be advanced and something done in a constructive way toward " fever control."

Similarly the cancer problem when broken down into its many components becomes much less formidable. Because a great deal is known about cancer of certain anatomical sites and generally speaking those forms which are most prevalent are, fortunately, most amenable to prevention and control.

It is significant that cancer is receiv-

ing increasing attention by official health agencies, though not yet in a degree corresponding to its importance to the public health. This discussion of Miss Macdonald's indicates not only that something is being done about the problem in Massachusetts in an organized and systematic way, but also—and what is more important perhaps—notwithstanding the complexities of the data involved, a program of cancer control, to a surprising degree, is amenable to critical and intelligent appraisal, and indeed susceptible of a more critical analysis than is ordinarily applied to programs directed against our traditional public health problems.

It is hardly necessary to emphasize here that this appraisal was possible only through the application of statistical technics to clinical data. It is significant that heretofore the interests of the public health statistician and the epidemiologist for the most part have been limited to the infectious and communicable diseases. These diseases have mass manifestations such as attack rates, and rates of occurrence in relation to exposure, contact, age, sex, color, and usually only a limited number of environmental conditions, for all of which specially adaptable statistical procedures, through experience, have been reasonably well developed and standardized.

With the major shift in emphasis in public health over to such problems as cancer, heart disease, diabetes, mental health and rheumatism, additional technics will be necessary: first because of their chronicity, and the introduction of the time factor into practically every item of consideration, life-table procedure will undoubtedly find increasing application; second, because here, the data necessary for study and consideration are to a much greater extent clinical, and in the case of cancer, they must come from the clinician, surgeon, and radiologist, a group which traditionally is neither familiar nor particularly sympathetic with the statistical approach to medical problems.

Massachusetts is a pioneer state in cancer control. The past 10 years of experience give it not only an opportunity but a responsibility for leadership in stimulating within the professions generally, and in public health circles especially, an interest in and respect for critically technical appraisals of organized schemes directed to the control of the next great group of public health problems namely, chronic disease.

Integrating Industrial Hygiene with Local Health Service*

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INDUSTRIAL hygiene has developed in the United States during recent years at a rate not heretofore experienced. Few public health activities have enjoyed more spectacular growth in a short period of time than has this program for conserving the health of industrial workers. The reasons for this rapid development need not be reviewed here, but it is felt that they are of sufficient soundness to insure the continued advancement of this phase of public health. It is gratifying to observe that the physical welfare of the industrial worker is finally receiving the attention which has been merited for many years. Workers who have pioneered in this phase of public health service must be pleased to see industrial hygiene incorporated as a legitimate function in so many of the state and municipal departments of health.

Indisputable evidence has been presented to show that the physical status of a large proportion of the gainfully employed is less favorable than that of the population as a whole. It is also true that many of the factors responsible for these unfavorable health experiences in industry are amenable to control through public health efforts. There is little doubt, therefore, that with the continued development of preventive medicine, industrial hygiene will enjoy further growth, and it is predicted that the time soon will come when it will be included as a definite activity in the health service of every area having industrial health problems.

These recent developments in the field of industrial hygiene have had a somewhat revolutionary influence upon the scope of activities covered by the service. The term industrial hygiene has been given a somewhat broader definition, and stripped of some of its highly specialized meaning in the minds of many health officials. This service formerly was regarded as a rather ultra-scientific field of endeavor dedicated to the control of specific occupational disease hazards. During recent years the program has been given a less exclusive and more understandable meaning.

In addition to research and special studies, industrial hygiene may now be interpreted as dealing with less specific conditions which may also be found in any community. The scope of the service, as now conceived, is so broad as to run the whole gamut of preventive medicine from the study and control of silicosis to antityphoid inoculations of industrial workers. In other words, the

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scope of the service has been stretched so far in the minds of some health workers that it literally represents general public health work in industry with somewhat greater emphasis on specific than nonspecific occupational health problems.

It is not within the province of this discussion to defend or condemn this generalized point of view concerning the service. It does appear appropriate, however, to point out some of the duplications of effort which would be likely to arise by inaugurating a generalized industrial hygiene program in a community already served by a well organized public health program. It would not appear logical for industrial hygiene workers to engage in an active industrial syphilis or tuberculosis control program in a locality already served by such programs. It is the opinion of the authors that the industrial service in any area of sufficient importance to support such an activity should be concerned with specific industrial health problems. Participation in other fields of health work would only seem justifiable under unusual circumstances and when such help would be sought by officials responsible for such non-industrial activities. These opinions are expressed here because they help define the scope of industrial hygiene activities which will be dealt with elsewhere in this paper.

Perhaps one of the principal reasons for the afore-mentioned broad interpretation which has been placed upon the scope of industrial hygiene service was directly related to shortage of adequately trained workers to man new industrial hygiene organizations. It has been inferred that the most accessible route of entry of inadequately trained workers into the field of industrial hygiene is by way of generalized activities with which they are familiar. This appears to be a logical route provided the individual possesses adequate basic training both in the fields of their respective specialties and in public health and provided, furthermore, that the so-called "generalized" approach deals with circumstances which seem to be related specifically to industrial health problems.

This discussion is concerned with the extension of industrial hygiene activities to municipal and rural areas having sufficient problems to justify this type of health service. Suggestions are not made concerning the inauguration of these activities in any given area; neither are these suggestions considered adequate to meet all local needs. An effort is being made, however, to suggest how such health protection may be added to a well organized local public health program. Development of this service in municipal and rural departments of health has been delayed to a certain extent, due to confused or erroneous ideas as to what industrial hygiene should be concerned with and the extent to which it should be carried out. The term industrial hygiene alone has scared some health officials, but it really is not so awe-inspiring when boiled down to simpler language and viewed at closer range.

The extent to which an industrial health program is developed in local departments of health is governed by many factors, including size of the industrial population and magnitude of health hazards in the area, together with other factors such as budgets, development of existing services, availability of extra-departmental consultation service, etc. Some municipalities in the United States possess facilities for inaugurating adequate industrial hygiene divisions or bureaus within their health departments. Other cities and rural areas are less fortunate, and many of them could not provide complete programs of this type either with or without the assistance they would be able to procure from outside sources. It is these latter types of health agencies which will be specifically

considered in this discussion. In suggesting ways and means of bringing industrial hygiene service into such organizations it is presumed that extra-departmental advisory service can be provided by or through the state departments of health. More than half of the states have industrial hygiene services in their departments of health, and no doubt there are many municipal and rural health departments which could receive assistance from these services.

Local health departments having well organized engineering, medical, and nursing services under the administrative supervision of a progressive public health official should be able to render a definite amount of industrial hygiene service. By way of illustrating how such workers may render service, the engineer is an excellent example.

Public health engineering has developed to the stage where competent engineers should be obtainable by all full-time municipal departments of health. No type of worker is in a better position to render efficient technical service in a general public health program, and this statement can be applied with equal emphasis to industrial hygiene. The basic training of such workers equips them to carry out many of the fundamental duties involved in a program of this type. The basic industrial hygiene engineering activities are quite similar to those to be found in any generalized public health program, and the application of measures for controlling many occupational health hazards is not unlike those measures which are often used in any general public health engineering program. Although it is very desirable that engineers have special postgraduate training before attempting to do industrial hygiene work, it is not absolutely necessary that such specialized training be obtained before attempting to do any work along the lines visualized in this discussion.

An assistant engineer connected with a well organized local department of health and under the supervision of a competent engineer-director should be able to coördinate his own routine activities with those which he would be in position to carry out in plants. Unless the engineer-director or the assistant has had experience or postgraduate study in industrial hygiene, these activities in industries should be limited to general conditions affecting industrial health, such as plant housekeeping, plant sanitation, general ventilation, lighting, etc. Engineers experienced in industrial hygiene or those completing graduate study in the various control phases of industrial hygiene could include in addition the more technical problems including air sampling for dust counts or chemical analysis. It would appear that any engineer of the type under consideration even though lacking experience or postgraduate training could be able to make cursory inspections of plants and be able to render advisory services along general lines.

The local engineer would be the logical intermediary or local contact through which state industrial hygiene services would be rendered. This discussion of the coördination of state and local industrial hygiene services does not recognize any plan whereby state services would be rendered in any health jurisdiction independently of local participation. Consequently, some local worker having definite responsibilities in this field would be valuable to both health agencies regardless of the amount of specific knowledge he might have concerning industrial hygiene. It is presumed that the man occupying this position would possess sufficient basic knowledge of engineering and enough common sense to know the extent to which he could render effective service in such a station.

The average state industrial hygiene organization in existence at the present time is not of sufficient size and character to deal directly with all of the indus-

trial hygiene problems in the state. Consequently, any type of local coöperation which is worthy of the confidence that would be placed in it would be a beneficial "substation" or "transformer" through which the limited services that state organizations could render would be transmitted to the intended beneficiaries of the service.

By way of illustrating how such a local engineer would coöperate with state officials in an industrial hygiene program, two examples are given. First, let it be presumed that a special investigation is to be made of the lead hazard in the printing industry. The specific studies involved in this investigation would be made by the state industrial hygiene workers through and in coöperation with the local health officials. The local engineer would participate in these investigations, thereby being able to increase his knowledge of the problem and its control. Subsequent to the studies certain follow-up investigations would be indicated for the purpose of assisting local plant officials in correcting unsatisfactory conditions revealed by the study. He would also be able to observe general environmental conditions in the plants periodically to note progress in control efforts. It might be desirable to collect dust samples from time to time for subsequent check-up on plant operations. The plant officials would be likely to want information on certain questions, and it would be advantageous to themselves as well as the local health department if they could get this information locally without having to wait several days for the information to come from the state workers.

The second example of how a local engineer can render effective industrial hygiene service can be applied to a preliminary investigation of a local request for service. For example, a plant official desires assistance in determining whether a particular manufacturing process is hazardous to the health of the workers. The natural procedure for him to follow would be to call on the local health department for aid. The engineer would visit the plant and obtain specific information concerning the problem. In some cases, possibly he would collect air samples, knowing that past studies had shown that certain threshold limits for safety had been determined for the materials involved. If the services of the state industrial hygiene workers were indicated he would supply valuable advance information concerning the probable hazard, the materials used, and the type of investigations which would seem indicated. This service would better enable the state workers to visit the local plant properly equipped to render the necessary assistance with the minimum amount of effort and time being expended.

It would seem possible to develop in some local departments an effective industrial hygiene control program designed to correct specific environmental conditions within the plant which might be responsible for occupational diseases. The complete state industrial hygiene service, which might be considered the more technical unit able to carry on complete industrial studies, would be available to the municipalities for consultation and for the more involved technical studies.

The engineer who has been used in the above discussion might not be able to devote his entire time to industrial hygiene. It would appear that, in a well organized public health engineering program, room can be found for a basic amount of industrial hygiene activities of the types outlined. Such services, if on a part-time basis, would be assigned to an engineer having other duties somewhat related to industrial hygiene. For example, school sanitation, housing, factory waste disposal, etc., might be the duties of this worker. Some or all of these services would include activities which would be closely

related to similar ones to be found in plants. General ventilation, lighting, and sanitation are examples. Such joint activities should be planned by the local health administrators to insure proper coördination, and so that a balanced program would be carried on in all these fields of activity. It would be advisable to develop these services with the idea of gradually transferring the school sanitation and other activities to other workers in the department as soon as additional personnel could be procured, thus progressively increasing the engineer's duties in the field of industrial hygiene.

Some local health departments might not have an engineer-assistant available for engaging in industrial hygiene, but it might be possible to utilize the services of some other worker in the engineering division. For example, a college graduate with several years' experience in general community sanitation might be the only man available. Even though he might not have had any formal engineering training, it would seem that such a worker could render some effective service in this capacity. The scope and type of his work would not be on the same plane perhaps as that of an engineer, but, with the same type of supervision and assistance as outlined above, it would seem that he could make a worth while contribution in this field of service.

The foregoing illustrations of how industrial hygiene service might be added to the program of local health departments have been confined to the sanitary engineering division. It is not implied, however, that other local workers might not be given responsibilities in such a coördinated activity. The medical and nursing workers should be able to carry on some worth while activities along their respective lines of endeavor. The ways whereby these people may be of service will not be outlined in detail here. It appears sufficient to state that the medical officer and any assistants he might have would have opportunities to participate in studies made by state industrial hygiene workers. They should also be able to make cursory investigations for the purposes of noting progress in control efforts and to make preliminary evaluations of potential health hazards in individual plants. The service which they could render to local physicians concerning the diagnosis and control of occupational diseases should receive the same type of consideration as consultation service concerning communicable diseases. Neither type of disease can be ignored in a properly organized preventive medicine program.

There is a growing demand for industrial nurses. Many of the plant nurses have had no training in public health but would be willing to coöperate in efforts to enrich the benefits of public health nursing service. It is just as important for the industrial nurse to practise preventive nursing as it is for the industrial physician to practise preventive medicine. Any public health nurse who overlooks the opportunity of working with plant nurses along these lines is missing an excellent opportunity to further the cause of public health. In addition to the general accomplishments in the field of general public health, there should be many opportunities for rendering definite nursing service in the plants. Many of the industries do not have nurses. These plants should afford excellent opportunities for the public health nurse to be of service along the line of general prevention and also in specific efforts to safeguard the workers against harmful exposures in the plant.

Other examples may be given of the ways in which local health people can coöperate with state workers in coördinating industrial hygiene service with other phases of the health program. It is felt that almost any well organized local health agency can carry out a cer-

tain amount of industrial hygiene work. They should not be expected to render the same type of service or to the same extent as the state industrial hygiene service unit. There is little excuse, however, for them to feel that they can make no contributions to such a service. They are confronted with the question of whether they will do nothing about this phase of public health or do all that is within their power. The authors feel that it is entirely possible and justifiable for such organizations to participate in this field of work along lines outlined in this discussion. Such service should be a definite contribution to both the state-wide and local programs of public health service.

Suggested Grouping of Slow Lactose Fermenting Coliform Organisms*

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DELAYED or weak fermentation of lactose by coliform organisms has been recognized since 1893,[1] yet the sanitary significance of such organisms in water and in milk and other foods is still extremely puzzling. In fact, it must be admitted that sanitary quality is not always easily determined even when typical coliform organisms are involved. In a recent survey of 25 water laboratories McCrady[2] found that 3 expressed doubt of the sanitary significance of coliforms producing less than 10 per cent gas in presumptive tests. Two of these laboratories did so on the ground that these organisms were usually found in waters where the sanitary survey indicated an excellent supply. One laboratory doubted their significance because they were considered to be attenuated or devitalized coliform organisms and therefore of little sanitary significance. On the other hand, some of the 15 laboratories attaching full significance to these organisms did so on the ground that they represented attenuated cultures that might be easily rejuvenated under natural conditions. McCrady suggested that "until sufficient evidence to the contrary is presented, water laboratories are well advised to include, in their routine coliform estimates, *all* coliform organisms confirmed from primary lactose broth."

As has been previously reported,[3] several water supplies in Connecticut when analyzed in strict accordance with *Standard Methods* failed to meet the U. S. Treasury Department standards for potable water. Nevertheless, sanitary surveys had indicated these waters were safe and in the last 25 years no epidemics of any sort had been traced to any of these supplies. From these waters an appreciable number of the coliforms found were isolated from primary lactose broth tubes showing less than 10 per cent gas in 48 hours. It is frequently postulated that environmental factors, such as chlorination, storage, and the presence or predominance of extraneous organisms, account for slow or weak fermentation of lactose by coliform organisms. When pure cultures react in this manner they are usually considered to be attenuated, degraded, or devitalized with respect to lactose, especially when the ability to ferment lactose rapidly is acquired after serial transplanting in lactose broth. In some cases it is true that the culture as a whole becomes a rapid fermenter through the restoration of a temporarily lost adaptive lactase. Frequently there

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is actually the elimination of a slow lactose fermenting variant by the overgrowth of a rapidly fermenting one in serial lactose transplants. The fact that slow fermentation of lactose by a coliform strain may be as inherent and fixed a property in that strain as is rapid fermentation by another strain, is overlooked by many bacteriologists. Consequently, to disregard slow or weak lactose fermenting organisms, particularly in the presumptive test, may be dangerous. Conversely, to condemn a water supply or a commodity simply because of their presence without further knowledge of the nature of the organisms in question may be unfair.

A proper approach to the problem of the sanitary significance of those members of the coliform group which ferment lactose slowly or weakly requires clear definition of terms. Even in the recent literature there has been a lack of consistent usage of the term "slow lactose fermenter" by individual workers. Some have used the term to apply to strains not producing gas in 24 hours at 37° C. while others have used it to describe strains not forming gas for 72 hours or even for many days. Still others have obviously been referring to weak fermenters rather than to slow. Recognizing the need for uniformity of usage, we are suggesting in this paper a logical terminology for the various types of these organisms which will hereafter be referred to collectively as "aberrant coliforms" rather than "slow lactose fermenters" since the latter term is insufficiently descriptive and has been used much too loosely heretofore.

We have used as a basis for the groupings suggested in this paper studies made in the last 3 years on more than 10,000 coliform cultures isolated from water, milk, soil, cereals and feces in the laboratories of Brown University and in the Bureau of Laboratories of the Connecticut State Department of Health. In our studies we have separated aberrant coliforms from typical coliforms using as a criterion for the latter types the formation of 20 per cent or more of gas in lactose broth in 48 hours at 37° C. In the course of this work several hundred of these aberrant coliform strains were isolated. Of these, more than 300 strains have been carefully studied in their biochemical reactions, especially reactions in lactose, and the antigenic relationships to typical lactose fermenting coliforms have been determined for about 100 of these strains. The results of these investigations seem to throw some light on the sanitary significance of certain kinds of aberrant coliforms. On the basis of these studies we suggest the following tentative classification of aberrant coliform organisms into four more or less definite major groups:

I. Micro-aerogenic coliforms
II. Pseudomicro-aerogenic coliforms
III. Papillae-forming coliforms
IV. Anaerogenic coliforms

A group tentatively called "non-lactose fermenting" coliform organisms will also be discussed but cannot at present be given definite recognition.

I. MICRO-AEROGENIC COLIFORMS

Organisms in this group are genuine slow lactose fermenting coliform organisms and they may belong to the *Aerobacter*, to the intermediate or to the *Escherichia* section of the coliform group. They produce acid in lactose broth with from a bubble to 10 per cent gas in 48 hours although some do produce 20–100 per cent gas in 3–9 days. In this group no low temperature effect is evident as in the case of some aberrant coliforms; in fact, these cultures produce acid and gas more slowly at room temperature than at 37° C.

The organisms of this group grow as well in 24 hours in lactose broth as do typical coliform cultures. At the end of 24–36 hours lactose broth becomes strongly alkaline. This is followed first

by acidification of the broth in the inner vial and then (1–4 days later) by a general acid reaction and the appearance of gas bubbles. So characteristic in the presence of indicator is the first appearance of acid within the inner vial while the surrounding medium is strongly alkaline that one would suspect an association between this lactose fermentation and anaerobic conditions. However, when a number of such cultures were incubated under partially anaerobic conditions no marked increase in the speed of fermentation occurred.

When plated on eosin-methylene blue agar, one or more days after having produced acid and gas in lactose broth, many cultures of this group develop only white colonies. When several colonies are transferred to lactose broth all transplants show acid and gas at approximately the same time as the parent culture. If the plate is incubated and examined daily it will be found that all the colonies develop black centers or sectors at about the same time. In our studies serial plating and transfer to lactose broth failed to increase the speed of fermentation of several cultures.

Some cultures of this group, when plated on E.M.B. agar in the manner just described, develop both black and white colonies. Black colonies transferred to lactose broth produce acid and gas more rapidly than white ones do but, after selection of black colonies throughout a series of platings, gas production is seldom so rapid as that of typical coliforms.

Frequently organisms of this group fail to develop a black center but a dark area, always in the form of a triangular sector, appears in the colony. When replated or fished to lactose, such areas produce cultures fermenting lactose faster than does the parent colony but not so rapidly as do typical coliform cultures.

The majority of organisms studied in this group belong to the *Aerobacter* section. Such organisms are abundant in soil. Of 107 cultures isolated from soil in a rigidly posted area, 103 were micro-aerogenic *Aerobacter* and the other 4 were typical strains of *Aerobacter*. Micro-aerogenic coliforms isolated from water and milk have been predominantly of the *Aerobacter* section, occasionally of the intermediate section, and even less frequently of the *Escherichia* section of the group.

Many micro-aerogenic strains isolated from soil and occasionally from water and milk possess unusual colonial characteristics on E.M.B. agar. These colonies are flat and colorless—sometimes with a veil-like edge that has a marked tendency to spread. After 2–3 days one or more colonies on a plate develop into the usual, large, raised, mucoid and confluent type so characteristic of *Aerobacter*. Transplants from the "new growth," however, like the parent, ferment lactose slowly. Cultures occasionally lose their ability to produce either acid or gas from lactose though still fermenting dextrose readily. Cultures with these unusual colonial characteristics were isolated in large numbers from soil and sometimes from water and milk, but never from feces.

In spite of the fact that organisms of our Group I are predominantly *Aerobacter* strains, the difficulties of evaluating the sanitary significance of the presence of organisms of this group without determining the Imvic [4] reactions of the individuals isolated are illustrated by the following facts: True micro-aerogenic *Aerobacter*, intermediate and *Escherichia* cultures have been isolated from normal and pathological human feces, admittedly in small numbers. It is noteworthy that they were almost invariably accompanied by coliforms which fermented lactose with normal gas production. Furthermore, we have encountered an appreciable number of micro-aerogenic strains of all three sections in public water supplies,

mostly from samples of untreated water. Consequently, the sanitary significance of the micro-aerogenic coliforms would seem to depend upon their association with typical coliforms in the same sample and upon the sanitary survey.

II. PSEUDOMICRO-AEROGENIC COLIFORMS

This group differs from the micro-aerogenic group in that the slow or weak fermentation of lactose at 37° C. as detected in the presumptive test gives a false indication of the lactose-splitting activity of its members which are capable of normal lactose fermentation at a lower temperature. A differential in favor of a low optimal temperature is therefore the distinguishing characteristic of the pseudomicro-aerogenic group.

We have studied 137 aberrant coliforms with optimal temperatures below 37° C. but with general biochemical and serological reactions otherwise comparable to those *Aerobacter* and intermediate strains which actively ferment lactose at 37° C. These 137 cultures, isolated from water, soil, and milk, produced acid in lactose broth in 24–28 hours at 37° C. Some of them produced from a bubble to 10 per cent gas in 48 hours; others produced no gas in lactose broth in 21 days. Generally these cultures when plated on E.M.B. agar and incubated at 37° C. developed colonies ranging in size from that typical for coliform organisms down to colonies barely visible to the eye. The large colonies were wholly characteristic of typical *Aerobacter* or of intermediate organisms; that is, raised, moist, and confluent with a dark center or flat, dry and discrete with a large black center and high metallic luster. The small colonies were similar to the large except that the smaller the colony the less intense the black center, very small colonies being white. It was discovered that when the plate was left at room temperature for 24–48 hours, all colonies became large and typical for either the *Aerobacter* or the intermediate type.

The fermentation of lactose and the Imvic reactions of these organisms at 20° C. varied markedly from those at 37° C. All cultures produced acid and 20–100 per cent gas in lactose at the lower temperature in 24–72 hours. Some cultures negative on Simmons' citrate agar after 5 days at 37° C. were positive after 24 hours at 20° C. Many cultures were positive to some degree in both the methyl red and Voges-Proskauer tests at 37° C. but were negative in the methyl red and strongly positive in the Voges-Proskauer test at 20° C.[5]

An explanation of the MR-VP results is afforded by parallel growth curve determinations on three of these cultures at both temperatures. After 18–24 hours at 37° C., when one would expect formation of acetyl methyl carbinol to be well under way, the cultures were found to be in the stationary period or in the period of decline. On the other hand, 20° C. cultures were in the logarithmic phase at this time and for several hours later, and thus were capable of producing abundant acetyl methyl carbinol. Furthermore, the maximum concentration point of the cultures at 20° C. was several times higher than at 37° C.

When 44 of the 137 cultures failed to produce gas at 37° C. an attempt was made to convert them into normal lactose fermenters by serial transplants in lactose broth every 48 hours. At least 20 per cent gas was produced by 1 culture after 4 transplants; by 3 cultures after 8; and by 1 after 12 transplants. The remaining cultures up to this point had produced no gas at 37° C. The 12th transplant of each culture remained at 37° C. without further transplanting for 9 days. When finally transplanted again to lactose, 32 of the 44 cultures failed to grow. This appeared to indicate that a temperature of 37° C. was an adverse environment.

Accordingly, 27 of these 32 cultures were transplanted from the original stock cultures to lactose broth and after 24 hours each culture was transplanted to two tubes of lactose broth, one of which had been stored at room temperature and one of which had been preheated at 37° C. All cultures were then incubated at 37° C. All cultures inoculated into the broth that had been stored at room temperature produced acid in 24–48 hours. Only 3 of the cultures in the preheated lactose produced acid in 48 hours; the remainder either failed to grow or to produce even acid in 2 weeks. Apparently the time required to raise lactose broth from approximately 20° C. to 37° C. in an air heated incubator was sufficient for these pseudomicro-aerogenic cultures to start growing, and once started they continued to grow even in an adverse environment.

Ten cultures producing no gas at 37° C. were plated from lactose broth to E.M.B. agar and the plates incubated at 37° C. After 24 hour incubation one of the largest colonies from each culture was fished to lactose broth. After 48 hours at 37° C. the lactose broth cultures were again plated on E.M.B. agar and one of the largest colonies transferred to lactose. By repeating this process, selection of active fermenters within the parent cultures was possible. After from 3 to 5 such platings large colonies from 3 cultures could be depended upon to produce acid and 20 per cent gas in lactose at 37° C. in 24 hours. Nevertheless, after 10 such platings (20 successive transplants to a medium containing lactose) small non-gas-producing colonies could be isolated from these 3 cultures. For several platings the percentage of large colonies definitely increased, but whether a pure rapid lactose fermenting strain could have been obtained from any of the 3 cultures is questionable. Although 2 of the cultures after 10 platings gave cultures producing acid and 20 per cent gas at 37° C. in 48 hours, the remaining cultures after 10 platings failed to develop colonies producing gas in any quantity in 48 hours at 37° C.

Here we are obviously dealing with a temperature effect. No attempt has been made to determine the optimum temperature for these pseudomicro-aerogenic coliform organisms but it seems reasonable to assume that it is considerably below 37° C.

All of our pseudomicro-aerogenic cultures were isolated from water, milk, and soil. No such cultures were found in 600 fecal specimens. Moreover, about 82 per cent of these cultures belonged to the *Aerobacter* section of the coliform group with the general Imvic * formula of −− +++ and the remainder belonged to the intermediate section with the general formula −+ −++. No member of the *Escherichia* section with the temperature requirements of this group was isolated from any source.

There can be little or no question of the phylogenetic relationship of *Aerobacter* strains in this group to typical *Aerobacter* since 19 per cent of 22 such cultures agglutinated in 9 heterologous *Aerobacter* antisera to an average titer of 534 as compared with agglutination of 17 per cent of 103 typical *Aerobacter* cultures in the same antisera to an average titer of 1,148.[6]

A pseudomicro-aerogenic coliform organism may then be defined as one with an optimal temperature below 37° C. whose general biochemical and serological reactions are otherwise comparable to typical cultures of the *Aerobacter* and intermediate sections. In view of their temperature requirements, because they were not isolated from feces but from water, soil, and milk, and since no

* The fifth reaction given is production of gas in cellobiose, not included in the original "Imvic" series.

comparable strain in the *Escherichia* section was encountered in a study of more than 10,000 coliform cultures from all sources, it is difficult to see how any sanitary significance can be attached to such organisms. Our experience suggests the advisability in routine water analysis of preheating the lactose broth and of rapidly warming the sample to 37° C. for the presumptive test where relatively large amounts of the sample are to be used. In many cases this would avoid weak fermentation of the lactose by this group of aberrant coliforms which are incapable of splitting this sugar unless growth is initiated at a lower temperature.

III. PAPILLAE-FORMING COLIFORMS

The term "papillae-forming coliforms" is suggested for the general description of those members of the entire coliform group which show the characteristics of organisms originally described by Neisser [7] and termed *Bacterium coli mutabile* by Massini.[8] The term "*coli mutabile*" is considered inadequate because it implies restriction of its use to members of the *Escherichia* section and is controversial because it implies that the type of variation evidenced by such organisms is a true mutation.

Organisms in this group may produce acid and small amounts of gas in lactose broth in 48 hours. Later as much as 30–40 per cent gas may be produced. When growth from a lactose tube in which acid and gas have been produced is plated on E.M.B. agar, both black and white colonies develop. Black colonies possess every characteristic of typical coliforms and when transferred to lactose broth produce acid and 20 per cent or more gas in 18–24 hours. Moreover, cultures established from black colonies breed true and their origin as a variant of a slow lactose fermenting strain can be determined only by serological methods.[9] White colonies in 2–5 days show several small, black, daughter colonies within the white parent colony. A white colony transferred to lactose produces acid and gas slowly and, when replated, black and white colonies again develop.

Many workers [10–14] have agreed that the "mutating" tendency of these organisms is as fixed a character as is the ability of a normal coliform to ferment lactose rapidly. Massini's original culture remained constant in this "mutating" characteristic for 22 years. In the laboratory at Brown University a culture isolated from a severe gastroenteritis case remained constant for 15 years despite many attempts to alter this characteristic. However, serial transplants of papillae-forming coliforms in lactose broth, especially if the transplants are made some time after acid and gas have formed, often result in a pure rapid lactose fermenting strain. This is not a true change in the fundamental nature of the strain but rather an elimination of the slow lactose fermenting variant because the longer the lactose tube is incubated the greater is the relative proportion of rapid lactose fermenters in the culture. Consequently, successive inoculums carry increasingly larger numbers of rapid lactose fermenters until a pure culture of the latter type results.

Coliform organisms showing the characteristics of this group may belong to the *Aerobacter*, the intermediate or the *Escherichia* section. The great majority, however, appear to be *Escherichia*. Despite the fact that Seiffert [15] in 1912 pointed out the differences between slow lactose fermenting coliforms and *Bacterium coli mutabile*, so many investigators have failed to make any distinction that it is difficult to determine how many were dealing with this papillae-forming group. Consequently, it is impossible to gain much information from the literature regarding the distribution of these forms in nature.

When we consider this group, it is evident, as Dulaney and Smith [16] and others have pointed out, that organisms that produce a small amount of gas from lactose are more often found in pathological fecal specimens than in normal feces. It is interesting to note that Massini's original culture was isolated from a case of "mild gastroenteritis."

Over a period of 2 years we plated fecal samples from 100 normal individuals on E.M.B. agar. Three of these samples yielded aberrant coliforms; none produced papillae-forming coliforms. Shortly after the work on normal individuals was completed fecal samples from more than 100 gastroenteritis patients and food handlers involved in an outbreak were studied. Papillae-forming and anaerogenic coliforms were isolated from 52 per cent of the individuals. There is no evidence to show that aberrant coliform organisms were the cause of this or similar outbreaks but the association noted here and reported by other workers would seem to be too frequent to be mere coincidence.

Because agglutinins for aberrant coliform organisms have been found in the blood of patients with gastroenteritis, Dudgeon and Pulvertaft,[17] Fothergill,[18] Ziegler,[19] and others are inclined to consider such organisms etiologically significant. Dudgeon,[20] Saniford,[21] Dulaney and Smith,[16] and others feel that the etiological rôle of these organisms has not been proved. We are inclined to agree with Parr [22] and with Dulaney and Smith [16] that the presence of aberrant coliform organisms in the intestinal tract may represent an alteration in the normal fecal flora, possibly as a result of a physiological disbalance in the individual. It has been shown [23] that a typical coliform isolated from a normal individual was identical, biochemically and antigenically by the mirror test, with a papillae-forming culture isolated from a patient with gastroenteritis. The infectivity of typical coliform organisms, particularly in the genitourinary tract, is too well known to merit further comment. It is wholly possible, therefore, that the infectivity of aberrant coliforms is not different from that of normal coliforms and is in no way conditioned by an altered reaction to lactose.

Serologically, "*coli mutabile*" strains of the *Escherichia* section did not prove to be so closely related to typical *Escherichia* as was previously demonstrated [6] for pseudomicro-aerogenic *Aerobacter* to typical *Aerobacter*. Of 113 typical *Escherichia* strains, 38 per cent agglutinated in 10 heterologous *Escherichia* antisera to an average titer of 1:1,261 while only 5 per cent of 32 papillae-forming strains of *Escherichia* agglutinated to an average titer of 1:250 in the same antisera.[23]

The facts presented strongly suggest that this group is the most important of all the aberrant coliforms from a sanitary standpoint. Perhaps the presence of papillae-forming coliforms in a commodity should carry even more weight than the presence of typical coliforms. Yet, if present, they are frequently not detected by routine methods, for instance, by *Standard Methods of Water Analysis*, since many strains do not produce gas or even acid in 48 hours.

IV. ANAEROGENIC COLIFORMS

To this group belong coliform organisms which produce acid in lactose broth in 1–7 days without gas production. Some of these produce gas from other carbohydrates. Others are anaerogenic in all carbohydrates and would ordinarily be classified as *Shigella* or *Eberthella* on the basis of their carbohydrate reactions.

That some of the anaerogenic organisms which might ordinarily be termed *Shigella* or *Eberthella* are coliform strains is illustrated by the behavior of 6 cultures isolated in the outbreak pre-

viously referred to and tentatively classified as *Shigella*. Three of these cultures spontaneously acquired the ability to produce gas in lactose broth and other carbohydrates, and a gas producing variant was isolated from a fourth culture. The other cultures are still being carried as anaerogenic although an occasional transplant to lactose produces from a bubble to 20 per cent gas. When E.M.B. plates were made from a gas producing transplant and 50 colonies fished to lactose, although acid and gas sometimes occurred in one or two tubes, no stabilized gas producing strain could be secured.

The relationship between anaerogenic coliforms and other members of the coliform group is not entirely clear. However, we cannot entirely support the suggestion of Breed and Norton [24] that the term "coliform group" be restricted to gas producing strains used as a measure of pollution in water since there is substantial evidence that a close relationship does exist. As previously pointed out,[5] many typical coliform cultures isolated from soil, water, and milk may lose their ability to produce gas in lactose. One culture isolated from milk as a typical coliform gave rise to a variant producing no gas in any carbohydrate after being carried in stock for 2 years. The parent and variant strains were antigenically identical.[9] A similar situation appears to be true for micro-aerogenic coliforms. Furthermore, originally anaerogenic cultures isolated from the same sources sometimes acquired the ability to produce gas in lactose. Although we have no real supporting evidence, we are inclined to believe that micro-aerogenic and anaerogenic coliforms when isolated from soil, water, and cereal are for the most part more primitive forms or "infra" [25] coliforms, whereas when isolated from apparently normal or from pathological feces they may merely be altered normal coliforms, non-pathogenic themselves, but suggestive of a pathological condition. Although the present methods of water analysis are not designed to detect the presence of anaerogenic coliforms, the question of their sanitary significance should be left open for future investigation.

Non-lactose-fermenting coliforms—In addition to the four groups of aberrant coliforms described, there is some evidence to show that non-lactose fermenting coliform organisms exist. The taxonomic position of these strains is not clear since they are represented by cultures intermediate between the coliform group and various non-coliform genera such as *Shigella, Proteus, Salmonella,* and *Serratia*. Penfold,[26] Hershey and Bronfenbrenner,[27] and others have produced non-lactose fermenting strains from typical coliforms after growth on chloracetic acid or sodium succinate media. Two typical coliforms isolated from milk by us produced non-lactose fermenting variants after being carried on agar slants for more than 2 years. Mirror tests have shown the variant strains to be antigenically identical with the parent strains.[9] Micro-aerogenic coliforms isolated from soil not infrequently lose their ability to ferment lactose while still producing acid and gas in dextrose and still retaining all other biochemical characteristics of the parent culture.

Frequently we have isolated from normal and from pathological feces certain non-lactose fermenting organisms producing acid and gas in dextrose, in sucrose or salicin or both, and in mannitol. Several such strains were encountered in the outbreak of gastroenteritis previously mentioned. Because of the production of indol and of acid and gas in sucrose or salicin or both we have been reluctant to record them as *Salmonella*. Though they were motile, the fact that there was no indication of "swarming" and that they produced acid and gas in mannitol [28]

seemed to suggest a closer relationship to the coliform group than to *Proteus*. Since their Imvic reactions were ++−−− these cultures might be classified as non-lactose fermenting coliform organisms. Our knowledge of these types is so limited that no suggestion of their relationship to the coliform group or of their sanitary significance can be advanced at present.

SUMMARY AND CONCLUSIONS

Because much confusion in terminology has occurred in the literature relating to "slow lactose fermenting" members of the coliform group, it is suggested that the term "aberrant coliforms" be used to describe all Gram-negative, non-sporulating rods which ferment lactose slowly or weakly at 37° C.

Based on a study of more than 10,000 coliforms isolated from water, soil, milk, feces, and other sources, a tentative separation of the aberrant types into four groups is proposed as follows:

Aberrant Coliforms—Strains differing from typical coliforms in respect to their fermentation of lactose (producing less than 20 per cent gas in 48 hours at 37° C.).

I. *Micro-aerogenic coliforms*—Aberrant coliforms producing gas from lactose slowly or in small amounts at either 37° C. or 20° C.

II. *Pseudomicro-aerogenic coliforms*—Aberrant coliforms having the characteristics of the true micro-aerogenic strains at 37° C. but showing normal lactose splitting activity at 20° C.

III. *Papillae-forming coliforms*—Aberrant coliforms showing the type of dissociation evidenced by *Bacterium coli mutabile*, but not confined to the genus *Escherichia*.

IV. *Anaerogenic coliforms*—Aberrant coliforms producing acid but no gas from lactose.

The existence of a group of non-lactose-fermenting coliforms is recognized but this group is not sufficiently well delineated for satisfactory discussion.

The exact sanitary significance of aberrant coliforms is not entirely clear. The true micro-aerogenic coliforms (Group I) probably have a significance similar to that of comparable *Aerobacter*, intermediate, and *Escherichia* strains showing typical lactose fermentation. It is hardly logical to concede any significance to the pseudo-micro-aerogenic group (Group II) which is made up entirely of low temperature loving members of the *Aerobacter* section together with a few intermediates isolated from soil, water, and milk and which we have not isolated from feces in this investigation. The papillae-forming group (Group III) will be detected only infrequently in routine coliform estimates in which gas production is used as the criterion for their presence and the anaerogenic group (Group IV) will not be detected at all. However, these two groups may be highly significant because of their frequent association with gastroenteritis and genitourinary infections. Certainly no aberrant coliform giving a positive completed test in accordance with a strict interpretation of *Standard Methods of Water Analysis* should be disregarded without a further study of its characteristics.

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"I'll Take Mine Pasteurized!"

"The value of proper supervision of the milk supply of a congested population area is being continuously demonstrated throughout the state by the freedom of most of these areas from serious epidemics. There still remain the negative demonstrations, however, where the same lesson is taught by 'horrible example.'

"The numerous examples of serious outbreaks in the past, seem ample proof of the medical authorities' contention that milk is an attractive range for homesteading by many types of malignant germs, and particularly those of the streptococcus family. For that reason, since milk is most universally used for human food, it becomes necessary to maintain strict regulation and supervision of its production and distribution. Such regulations quite often encounter bitter opposition from the champions of individual liberty. I have on my desk, for instance, a copy of an editorial which attacks a proposed regulation for Middletown which would ban the citizens of that municipality from bringing in raw milk, even for their own consumption. . . .

"Well, now let's take a look at all sides to this question. I'll match my enthusiasm for individual liberty against the Middletown editor's any time. And I'm just as opposed to unwarranted governmental interference with individual freedom as any man in this country. But I put the emphasis on 'unwarranted.' Past experience with epidemics of disease traced to infected raw milk give considerable warrant for limiting the distribution of raw milk. For you see it has always been the policy of government in America to curb the individual when the exercise of his individual 'rights' interfered with the rights of his fellow citizens. That's why you can't park in front of a fire hydrant. *There might be a fire!* You see, government protection of the rights of all at the expense of the individual's unlimited freedom enters the field of possible damage to others as well as actual. That's the way it is with raw milk. It may be all right. But the government's regulations concerning it are based on the fact that past experience warrants the assumption that it may be all wrong!

"I used to be a very sincere defender of individual liberty as it affects raw milk. But I had to face facts. The rest of my former colleagues will have to face them sooner or later, also. Heating milk to a temperature of 143 to 145 degrees and holding it there for a period of 30 minutes, isn't too difficult. In the face of milk-borne epidemics in the state from 1917 to 1938 which affected the health of 8,382 people and involved 1,203 cases of typhoid, 123 cases of diphtheria, 1,442 cases of scarlet fever, 4,452 cases of septic sore throat, 311 cases of dysentery, 11 cases of polio and 840 cases of gastroenteritis, I'll take mine pasteurized!"—Condensed from an editorial in the *Endicott* [N. Y.] *Times*, January 4, 1940, and reprinted in *Health News* [New York State Department of Health], April 1, 1940.

Jaundice in Detroit*

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DURING the past year the Detroit Department of Health has been actively engaged in the epidemiological investigation of jaundice cases reported to this department. The first indication that an unusual number of such cases was present in various sections of the city came during January, 1938, when a physician practising in the northwest section reported 5 cases. In rapid succession, additional cases were reported in the same general locality. It became evident that the distribution of cases was city-wide, although there was a definite tendency of these cases to aggregate, as has been noted in a previous publication.[1]

An attempt was made to have all jaundice cases reported to the Department of Health during this study. Hospitals, practising physicians, school teachers, and nurses were requested to report the cases which came to their attention. Cases residing outside of Detroit city limits were not included. By observing the current cases and retrospective investigation of recovered cases, from November, 1937, to November, 1938, we were able to collect 220 cases of jaundice. This probably does not represent all the cases that occurred in Detroit during this time, but we know of no others. With no change in our endeavors, during the first 6 months of 1939 there were 80 per cent fewer jaundice cases reported than for a similar period of 1938.

Information about the cases is based primarily on the history given by the patient or parent rather than actual observation, since most of the patients were confined to their homes during the illness rather than to a hospital. Some of the variations in findings may be explained on this basis.

After carefully studying the epidemiological and clinical histories of 220 cases, 194 cases were selected which appeared most likely to be of an infectious type. The criteria for the selection were based primarily on the presence or absence of typical symptoms indicative of an infection, namely, chills, chilly sensation, temperature rise, nausea, vomiting, and headache for 4 to 7 days, followed by jaundice. Communicability, as shown by history, was also an important criterion. The remainder of the cases reported did not fulfil these criteria, although some may have been of an infectious type.

TABLE 1

Jaundice in Detroit

Distribution of Cases by Month of Onset, 1937–1938

Month	*No. of Cases*
November	8
December	20
January	42
February	37
March	36
April	32
May	14
June	5
Total	194

* Read before the Epidemiology Section of the American Public Health Association at the Sixty-eighth Annual Meeting in Pittsburgh, Pa., October 20, 1939.

The analysis of the selected cases presents certain important facts. The highest incidence of reported cases was during winter and early spring. We note from Table 1 that of the 194 cases studied, 135, or 69.6 per cent, were reported during December, January, February, and March. There was a marked decline during the spring, and no cases were reported during the summer.

TABLE 2

Jaundice in Detroit

Distribution of Cases by Age and Sex, 1937–1938

Age	No. of Cases	Sex	
		M.	F.
1– 4	5	4*	1
5– 9	77	39	38
10–14	85	36	49*
15 and over	27	16*	11
Total	194	95	99

* One case Weil's disease

From Table 2 we note that the difference in distribution, according to sex, is not significant. In the 5 to 9 age group there are 77 cases, and in the 10 to 14, 85 cases; 162, or 83.5 per cent, fall in ages between 5 and 14.

TABLE 3

Jaundice in Detroit

Number of Days between Alleged Onset and the Appearance of Jaundice, 1937–1938

Days	No. of Cases
1	12
2	10
3	14
4	26
5	23
6	22
7	40
8	10
9	4
10	5
11–14	15
15 and over	13
Total	194

Mean number of days — 6.7
Median number of days — 5.0

In Table 3 the cases are listed according to the number of days between onset and the appearance of jaundice. Twenty-six persons gave a history of 4 days; 23, 5 days; 22, 6 days; and 40, 7 days. One hundred and eleven persons, or 57.2 per cent, stated that they experienced a 4 to 7 day illness prior to the onset of jaundice. The mean between the onset and appearance of jaundice for the entire group was 6.7 days—the median 5 days. A number of persons experienced no prodromal symptoms. This may be because the early symptoms in many cases were very mild. It was quite apparent that in some instances the patient confused the prodromes with those of an acute coryza, or mild gastrointestinal disturbance.

TABLE 4

Jaundice in Detroit

Distribution of Cases According to the Duration of Manifest Jaundice by Days, 1937–1938

Days	Cases
1	0
2	0
3	0
4	3
5	10
6	32
7	51
8–14	70
15–21	14
22 and over	14
Total	194

Mean number of days — 10.5
Median number of days — 7.0

The distribution of cases according to the duration of jaundice is given in Table 4. Thirty-two patients gave a history of jaundice for 6 days; 51 for 7 days and 70 for 8 to 14 days. One hundred and fifty-three persons, or 78.8 per cent, showed jaundice that lasted 6 to 14 days. The mean duration of jaundice was 10.5 days, the median 7 days.

Table 5 shows the distribution of cases by duration. These figures take into consideration the actual period of

TABLE 5

Jaundice in Detroit

Duration of the Disease by Days, 1937–1938

Days	Cases
1– 7	23
8–14	90
15–21	49
22–28	17
29 and over	15
Total	194

Mean number of days — 14.9
Median number of days — 13.0

illness, that is, from the onset of prodromes to the disappearance or near disappearance of manifest jaundice. Ninety persons had an 8 to 14 day illness, and 49 a 15 to 21 day illness. The mean duration was 14.9 days, the median 13 days.

One hundred and thirty-nine, or 71.6 per cent, indicated that the total duration of their disease was 8 to 21 days. A number of persons dated the onset of the disease at the appearance of jaundice, thus shortening the actual period of illness. In some instances during the later stages of the disease, although the persons were still jaundiced to some extent, they did not feel acutely ill and returned to work or school. Thus, by history, the subjective symptoms of the disease are often absent before actual clinical recovery. Conversely, no cases were encountered which gave a history of continued illness after the disappearance of jaundice.

The occurrence of signs and symptoms in the cases studied is given in Table 6, by order of their frequency. Loss of appetite, coffee-colored urine, nausea, vomiting, and clay-colored stools were among the most common. Fever, loss of weight, headache, and drowsiness were noted in over half the cases. The temperatures ranged between 99.6° F. and 103.6° F. The highest temperatures were noted during the prodromal period. A lower grade of fever was observed during the time when jaundice was present. The loss of weight, although not marked, in some cases reached a maximum of 10 to 15 per cent of the body weight. Gastrointestinal disturbances, other than nausea and vomiting, were complained of by about half the patients. Backache, pain in the extremities, chills, chilly-sensation, and epistaxis, symptoms generally associated with Weil's disease, occurred in less than 20 per cent of the cases. However, the incidence of these manifestations is prevalent enough to be worthy of consideration in differential diagnosis.

TABLE 6

Jaundice in Detroit

The Absolute and Relative Occurrence of Signs and Symptoms by History or Observation, 1937–1938

Signs and Symptoms	No. of Cases	Per cent of Total Cases
Loss of appetite	181	93.3
Coffee-colored urine	177	91.2
Nausea	163	84.0
Vomiting	142	73.2
Clay-colored stools	130	67.0
Fever	119	61.4
Loss of weight	110	56.7
Headache	110	56.7
Drowsiness	101	52.0
Stomach ache	96	49.5
Backache	38	19.6
Pain in extremities	32	16.4
Chills	26	13.4
Epistaxis	25	12.9
Chilly sensation	23	11.9
Total cases	194	

TABLE 7

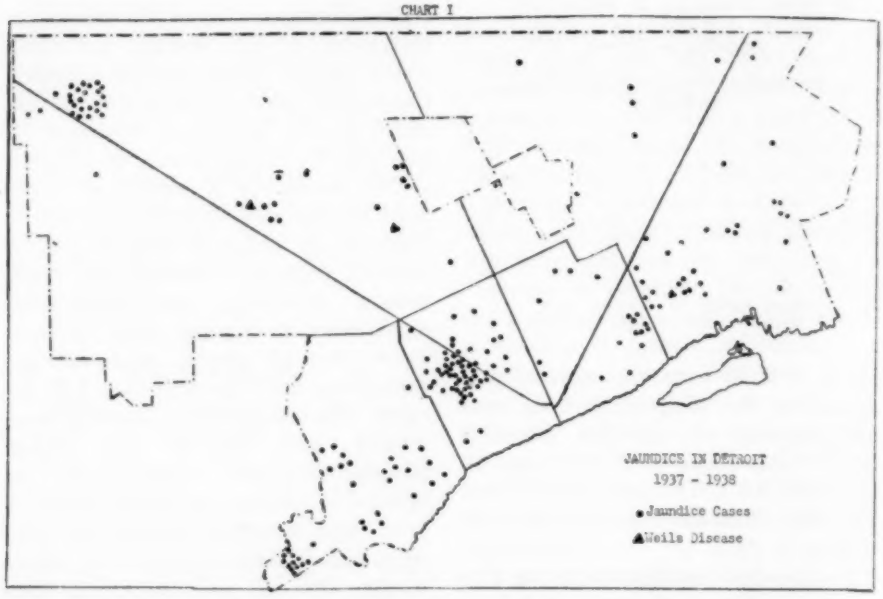
Jaundice in Detroit

Distribution of Cases by Families, 1937–1938

	Cases	Families
Number of families with one case		104
Number of families with multiple cases		40
Number of families with two cases	31	
Number of families with three cases	8	
Number of families with four cases	1	
Total number of families		144
Total number of cases	194	

We noted instances of multiple cases in families. Table 7 shows that the cases of jaundice were distributed among 144 families. Multiple cases were found

CHART I



in 40 families; 31 had 2 cases; 8 had 3; and one had 4. The number of persons affected in families was variable; in some instances only 1 child of 4 would become ill, while in others all the children would develop the condition with manifest jaundice. Contacts in some instances would develop the typical prodromes—some darkening of the urine and changes in the color of the stools, without jaundice. It is probable that on account of this variation in the behavior of the disease we missed some atypical secondary cases.

Geographically (Chart 1), the majority of the cases were reported from the west side of the city, although several were on the east side. It appeared at first that some relationship might exist between the incidence of jaundice and the Rouge River, which runs a winding, southerly course through the west side of Detroit. The first group of cases reported resided in proximity to the river and some patients admitted playing near it and skating. Careful investigation failed to substantiate a relationship.

Accidental immersion in water, cuts, bruises and abrasions of various parts of the body apparently did not have a significant bearing upon the development of most of these cases. Exposure to rats and rat-infested environments apparently did not influence the incidence of the disease in the majority of cases.

The presence of domestic animals in the infected households was a frequent occurrence. However, sick animals with indications, either by history or bacteriological or serological evidence of having suffered from an infectious type of jaundice, were found only in 5 instances. In 2 of the 5 we showed that owner and dog gave positive serologic reactions to the same strain of *Leptospira icterohaemorrhagiae*.

Of the 194 cases reported 171 were in children attending 57 schools. Two schools reported 21 each, and 8 over 6 cases each.

Probably the most significant epidemiological finding was the establishment of contact for 113, or 58.3 per cent, of the cases. The 113 persons

represent only those who gave a definite history of intimate contact with an active case. Cases with remote contact, as in schools, were not included.

TABLE 8

Jaundice in Detroit

Distribution of 113 Cases with Known Exposure by Probable Length of Incubation Period, 1937–1938

Days	*Cases*
1–7	12
8–14	26
15–21	40
22–28	16
29 and over	19
Total	113

The largest number of cases (Table 8) had a probable incubation period of 2 to 3 weeks. Forty appear to have an incubation period of about 2½ weeks; 16 of about 3½ weeks, and 19 in excess of 4 weeks; thus, 35 cases appear to have probable incubation periods in excess of 3 weeks.

The negative epidemiological findings suggest that food, water, or contact with animals had no bearing upon the occurrence of these cases. The distribution of cases over a long period coupled with the general city-wide occurrence seems to eliminate food and water as a probable source of infection. The establishment of known intimate contact for over half the cases, and the incidence of secondary cases in families, is strongly suggestive of a disease spread by person to person contact.

LABORATORY FINDINGS

Blood counts taken early in the disease showed a tendency toward leucopenia, ranging from 7,200 down to 3,500, with a relative lymphocytosis. In the cases of Weil's disease which we encountered there was a definite leucocytosis ranging from 12,000 to 29,000, with an increase in polymorphonuclear leucocytes.

The icterus index in the majority of cases exceeded 15. The blood specimens were usually collected at a stage of the disease when the jaundice was most intense.

Further laboratory findings were negative in the majority of cases. Blood, urine, and feces were collected from all cases coming to our attention during the first week of the disease. Serologic and bacteriologic examinations on 60 cases so studied were negative. Specimens of blood collected late in the disease for serological studies were negative in all but 4 cases, in 3 of which the agglutination tests were positive in diagnostic dilutions with antigens of *Leptospira icterohaemorrhagiae*, while the 4th was positive with *Bacillus paratyphosus B*. Klemperer [2] has suggested that *Bacillus paratyphosus B* may be of etiologic significance in some cases.

The cases of jaundice encountered apparently were not of a common type or etiology. One hundred and ninety cases out of the 194 were mild, simulating closely clinically and epidemiologically, those reported by Bates,[3] Pickles,[4, 5] Blumer,[6] Ramage,[7] Willett,[8] and Cullinan.[9]

COMMENTS

In view of the negative laboratory findings, the epidemiological characteristics, the clinical characteristics, and the blood picture, it has been suggested that epidemic or common infective jaundice, as the English workers call this disease, is probably of virus etiology. Recently, Findlay [10] has brought evidence that strongly suggests that a hepatotoxic agent having many of the characteristics of a filterable virus can be found in pooled human blood serum. He believes that this agent is probably a filterable virus and identical with the causative agent of common infective jaundice.

The one great difficulty encountered in trying to establish the virus etiology

of common infective jaundice is the lack of a suitable experimental animal. Attempts have been made to infect every known laboratory animal and, with one exception, all have failed. Findlay [10] reports having obtained febrile reactions in *Macacus rhesus* monkeys by feeding them with whole blood from cases of jaundice in the early stages. Whether this reaction is a specific reaction or not needs further study.

WEIL'S DISEASE

It is not within the scope of this paper to give a detailed discussion of Weil's disease or true infectious jaundice. A detailed analysis of the Detroit experience from an epidemiological and clinical standpoint will be presented in a forthcoming publication. There were 3 cases of Weil's disease, recognized in the series of 194 cases of jaundice. Five additional cases of Weil's disease were seen during the past 18 months, but are not included because they occurred out of the study period, or in the suburban area of Detroit.

Of the 3 cases of leptospirosis reported in this series one was an adult male whose occupation as a poultry dresser exposed him to the risk of the disease. Two other cases in poultry workers are recorded among the 8 Detroit cases. The second and third cases of Weil's disease were in a 3 year old male and a 14 year old female. The boy apparently acquired the disease from his dog, while the source of infection of the girl was not definitely established.

In the 5 cases not considered in the series, 2 were adult poultry dressers, 2 were of teen age and 1 an unemployed adult male. Accidental immersion in contaminated bodies of water was considered the possible source of infection for the last 3. The dog of the teen age male was found to be suffering from Weil's disease, though it had recovered clinically several weeks before the patient became ill.

It has been stated in general that rats, and in some instances dogs, acting as carriers are responsible for the cases of leptospirosis occurring among humans.[11] The Leptospira pass out in the rat's urine, come in contact with water, mud, and food, and then find their way into the human or animal body. Ample evidence of infection among rats has been found in our studies. About 25 per cent of rats trapped in Detroit were found to be carriers of *Leptospira icterohaemorrhagiae.*

Two kennel outbreaks of jaundice were encountered during the past 18 months involving 14 puppies. Blood specimens gave positive agglutination with *Leptospira icterohaemorrhagiae* but were negative for *Leptospira canicola.* Blood collected from 16 other jaundiced dogs gave similar serologic reactions. In 2 the sera gave positive agglutination with both *Leptospira canicola* and *Leptospira icterohaemorrhagiae.* These results suggest a preponderance of infection among dogs with the classical strains of Leptospira, in contrast to the California experience where apparently the predominating infection is with the canicola strain.

In contrast to epidemic or common infective jaundice, Weil's disease as a general rule follows a severe course. The onset usually is sudden with chills, fever, severe myalgic pains, headache, and temperature, followed by deep jaundice. Davidson [12] and others have noted a mild form of this disease simulating epidemic jaundice, and also a mild form of leptospirosis without jaundice. Epidemiological information can be invaluable in the differential diagnosis of the various types of jaundice. In cases of Weil's disease usually there is a history of exposure to a rat infested environment, immersion in wa-

ter, swimming, exposure to sick dogs, or an occupational risk, as poultry dressing, slaughterhouse work, mining, sewer work and fishing. Seasonally, the greater number of cases occur during summer and early fall, while epidemic jaundice tends to have its highest seasonal prevalence during late fall and winter.

Although the clinical and epidemiological pictures of these two diseases appear to be clear-cut difficulty may be encountered in the differentiation of a mild form of Weil's disease from a severe form of infective jaundice. To differentiate the various forms of jaundice a laboratory equipped to do Leptospira agglutination tests should be available. The number of reported cases may not warrant the additional laboratory facilities, but it is probable that with increased laboratory facilities the number of recognized cases would materially increase. Certainly this has been the experience of the Dutch [11] and English workers.

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Community Health Education*

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THE peak of public interest in health stands towering before us, challenging all of us, who are interested in health education. Let us examine the landscape. The tree of health is deeply rooted in the soil of the biological, sanitary, and social sciences. It is heavily laden with fruit for the enrichment of life. Many people regularly eat of this fruit knowing by experience of its qualities which make for completeness of body, mind, and of character. Some have seen only the blossoms, having gained but partially a perspective regarding personal and community health. A large number wander in a maze of other trees bearing only superstition, unsupported theories, and charlatanism. While clouds darken the horizon from time to time, blue sky is beginning to appear with a ray of sunshine.

Much of the confusion as to the meaning and methods of public health must be cleared away by careful instruction if we are to advance with maximum effectiveness. This confusion, by the way, is not surprising in view of the relatively new function of health education, of the rapid developments in the health field, and of the competition for interest in health between the authentic and the pressure groups. But progress in this field should be less difficult than in some other lines which bid for attention. For illustration, a scientist recently referred to the popularity of some of the concepts of Einstein even though the public has only a foggy notion of his theories. Or match with this the followers of Freud, thousands of whom, apparently have only a vague idea of his work. On the other hand, the elements of public health are not difficult to comprehend and many technics of health education have been developed. We need to use these technics and to rub shoulders with each other while selecting and using them.

Two closely related factors are involved in health education:

1. Application of health knowledge by the individual, involving improvement in health practices and attitudes to secure promotion of individual health. An essential feature is the health teaching of children in school as an integral part of the educational curriculum, but adult education is also an objective, with emphasis at all levels on learning by doing—participation.

2. Acceptance of responsibility by citizens who become aware through health education experiences of the needs and services, and recognize the opportunities and importance of giving their support to the development and maintenance of adequate health programs.

Both of these factors are dependent for success upon a third—the provision

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of professionally trained personnel, who have the vision, enthusiasm, and skill to work with people, lay and professional, as a team, in executing soundly conceived health programs.

Though many believe that the official health agency should lead in the planning and development of the health educational program, we are not of the opinion that health education can, or should, be the function of any agency alone; only by the coöperation of all related official and nonofficial agencies and professional groups can a community program be effective. The responsibility for program planning may be centralized in a single person or small group, but health education, to accomplish most, must be the concern and responsibility of the entire staff of all the health organizations in the community, each contributing to it wherever it can do best through its personal contacts and services. To insure that the elements be properly interwoven and a sound focus be obtained, there is required the use of sound educational technics under the leadership of trained and experienced workers.

Some of the objectives and trends may be considered under 10 headings—10 F's.

1. *Fullness of Living*—This is increasingly stressed as our main goal. The individuals who compose "the public" and are seeking for fullness of living must not only understand the various principles of hygiene as they affect their health, individually and collectively, but these same individuals must be motivated into putting the hygienic principles into practice.

People, by and large, live their lives behind almost impregnable ramparts of indifference to public affairs, engrossed in their own little problems, worries, and pleasures. When one surveys the ceaseless barrage of propaganda to which we are all subjected, he realizes the necessity for this protective wall. Nevertheless, the health educator's job is to penetrate these ramparts for, somehow, people must be made aware of their duties to themselves, their families, and their neighbors. We know that it can be done. There is room, even in the mind which seems to be completely occupied, for one more idea, if we can arrest attention, arouse curiosity, and appeal to a real want. Man's attention range is narrow, however. The educator must strike at the point where the defenses of apathy and self-interest are weakest.

If useful ideas are presented in such a manner as to create good will and favorable opinion, they may be acted upon. But motivation is necessary to provoke active response and influence conduct. The goals of public health education are so many and so diverse that only through teamwork of all community health agencies can there be hope of worth while achievement.

We must not assume that there is a well articulated, "science" of public health education. The pillars—psychological, sociological, and pedagogical—are, themselves, none too steady. Little use has been made of scientific methods in measuring the effect of educational projects and material. Though we must admit that this specialty in the public health field has, like Topsy, "just growed," it is not to say that there are no useful and trustworthy guideposts which the practitioner of health education may well follow. Also we recognize certain pitfalls into which pioneers have stumbled. These, too, we can mark—with warnings.

2. *Family and Community*—There are many conditions in the home which may affect the educational process. We need to view the community as a whole, to serve the family as a biological and sociological unit, to be more conscious of the church as an essential institution, and to minimize vested interests.

The "public" is not a vague mass

of people seeking health information. Far from it, the "public" is a very much alive group of men, women and youngsters, in families, who severally, go to make up the community. These individuals have characteristics of age, sex, race, occupation, religion, with varying economic and social levels, and all the resulting mixture of beliefs, traditions, and superstitions. Their interests and their vocabularies may have a bearing on their understanding of sound public health principles and practices. Their attitudes will run the gamut from stark indifference to violent opposition. As we consider our audience, let us bear these factors in mind.

3. *Fitness* — Among the gratifying trends we note promotion of employment of qualified personnel and of active board and committee member participation, with a stimulation of special university training of public health employees, definition of qualifications, better preparation of teachers, and encouragement of merit systems. Education to be effective must be done by people who have a background of educational experience. If health education is to be done, a knowledge of health principles and practices is also basic.

Public health education is not a water-tight compartment in the health program. It is an activity that permeates the fields of health and education. The sanitary engineer or the statistician usually has a well defined sphere of activity; not so the practising health educator. On the other hand, there should be much of the health educator in all the other specialists of the health agency staff. The health officer of today is no longer the sanitary policeman of an earlier generation. He should be, if he is to fulfil his obligations, a guide to his community in matters of health. The goal of the epidemiologist is not to enforce quarantine, but to teach people how to prevent the spread of infection. The sanitary inspector's chief purpose is not to catch violators of the sanitary code, but to instruct the proprietor how to secure the best sanitary conditions through good management of his property. The public health nurse is essentially a teacher of health in the home or conference. The clinics, and the physicians' and dentists' offices may likewise be useful centers for health education. Although each staff member of the health agency has obligations in the field of health education, there is still need for a health educator. In the small agency, the executive officer usually must assume, as part of his duties, those of the health educator. In larger agencies, a specialist in the field may be employed. Where the size of the staff warrants it, there should be a whole division of health education.

4. *Foresight*—Increasing attention is being given to planning with information of problems and resources, utilizing group thinking and committee projects. Health education is to be one of the projects in a health administrative program, to be administered by the executive officer, or by a specialist. What is to be done? Putting "first things first" is important. To determine what particular objectives are to be attained and how they shall be attacked requires a continuing analysis of the social and health conditions of the community, a decision upon the people who must be reached, and a selection of the services or ideas which will receive the greatest emphasis. The first task is to create a comprehensive picture of community life.

There are several reasons why it is useful to break down the community into homogeneous tracts to disclose such factors as race, habits, health hazards, occupations, and economic status. This is the best way (1) to make clear the emergent and orderly health education patterns; (2) to determine what groups are to be reached in order to improve

the situation most effectively; and (3) to adopt a program suited to the situation and the characteristics of the people to be influenced. Another obvious value of the community survey method is that the participants not only learn about the community, but acquire a sympathetic understanding of the problems of the different organizations, and receive a simulus for group planning and coöperative activity. It is supposed that the health officer will assume leadership in the conduct of studies of community problems and resources, but the other members of a study committee should represent all the social agencies and professions of the community engaged in health activities.*

5. *Facts* — Different kinds of facts are essential. Consider the national health plans and what they mean in terms of health education. The health goals toward which there are the greatest hopes of attainment are: promotion of maternal and child health; control of tuberculosis, syphilis, gonorrhea, pneumonia, and malaria; reduction of illness and incapacity from cancer and other chronic conditions; programs of industrial and mental hygiene, of nutrition, of housing. Which of these items should be stressed locally and when? What instruction should be given, and how should the schedule of activities be arranged in the preparation of a flexible calendar? Are there special local problems which should receive precedence over others? How small a part law enforcement will play in attaining these objectives! Practically, the programs will be largely educational, aimed at inducing people to follow hygienic precepts, to seek physical examination, and to obtain medical care when disease or defect is discovered. It is evident that the new national health program creates the need, as never before, for a psychologically sound, practical, productive health education program.

Facts as to what the people wish to know! As one observes the visitors at the two World's Fairs, for example, he is impressed with the great interest displayed in exhibits of an appendix operation, of the functions of glands, of the process of pregnancy, of sight conservation and work for the blind, as well as of pneumonia, syphilis, and tuberculosis.

What do we know or can we learn about pupil interest? In a California city, for example, 75 per cent of some 540 boys and girls in high school replying anonymously to questions regarding the biology course, stated as the most helpful—either "Study of the Human Body, or of Reproduction and Sex Hygiene." "Essentially, young people want to know how to be attractive, how to make themselves liked, how to get along with people, and they have one eye, more or less clear, on love and marriage."

In a coöperative study among 105 colleges, J. F. Rogers reports criticisms of college seniors: "By far the most numerous complaints of omission and suggestions for additions refer to matters concerning sex." One senior said "The discussion of sex should be elevated from the corner curbstone to the high school and college classrooms. It should be discussed frankly and not in subdued tones as an almost tabooed thing. Venereal diseases and misinformation are too prevalent for us to think that only the lower strata of

* There may likewise be need for a small but representative technical committee. On the national level, much has been accomplished by the Interdepartmental Committee to Coördinate Health and Welfare. In Connecticut, a growing sense of need for the formulation of policies to govern the development of the school health program led to the appointment of a committee to consider this entire field. This committee is representative of the more active professional and governmental groups concerned. Its functions are to advise the State Department of Education and to recommend appropriate policies, programs, and action. Its reports are discussed in the meetings of the various state agencies concerned and published in their journals.

society are lacking knowledge. Do something about it, please!" Shall we do something about meeting the interests of the pupil and of the family? Have we not too long overlooked the point of view and the conditions, ideas, curiosities back in the home, the consumer's viewpoint, in planning our health education programs?

Facts based on evaluation of problems and services! For example: School health education in the secondary schools of a southern state was evaluated [2] in terms of a state-wide study of dietary hygiene. Determinations of the food selection habits and dietary knowledge with their interrelationships among high school students were made in the light of possible causative factors.

In another study,[3] a health education program in the small rural elementary and the village secondary schools of a New York county was evaluated in terms of two objectives of the program, namely, the improvement of pupil health behavior and understanding in relation to health. Evidences of progress were sought through studies of pupil health practices, pupil health information, and phases of the program which may help to produce desirable changes.

The studies extended over a 6 year period during which time an experimental school health education project had been in progress. At the elementary level comparisons were made in this research between conditions as they existed in the one- and two-teacher schools near the beginning of the experimental project, and later in its growth. Comparisons also were made between conditions in this county and in a control group of schools in other counties.

Evaluation methods included pupil questionnaires on daily health practices; health information tests; classroom observations on pupil practices, teachers' work, and environmental conditions; teacher questionnaires on work in health education and health content of courses; school environmental surveys and parent interviews.

Other suggestions for evaluation have been given in the studies of the U. S. Public Health Service, and of the New York City Department of Health, in the *Appraisal Forms* of the American Public Health Association, and of the National Tuberculosis Association, and in the books of Turner,[4] and of Bauer and Hull.[5]

6. ***Funds and Resources***—We need to know what funds and resources are available for public health and for health education, as well as what would be desirable for adequate programs. The American Public Health Association and the few city and state departments of health and of education with reasonably adequate programs have much information on this subject. It is generally recognized among public health workers that the proportion of the tax dollar devoted to health has been and still is exceedingly small in comparison with other activities. But is the public aware of this fact? Furthermore, health education should not be the first function to suffer when curtailments are made, even though it may have been the last item added to the budget. When budgets are threatened, health education is most needed. Observe the methods used for sales promotion! Some of these contain a lesson for us in health education.

There are many aids and resources for those engaged in health education. Some of these may be obtained for the asking, others may be purchased or rented at small cost. For example, some 60 national agencies are interested in school health education, as revealed by the National Conference for Coöperation in School Health Education.

7. ***Flexibility of Program and Organization*** — Older public health workers

among us, who suffered the so-called health teaching and stilted classroom calisthenics of an earlier generation, are pleasantly surprised at the modern school health program which emphasizes the physical, mental, and social aspects of the school child's health and of the teacher's health. They find that today's school program includes learning experiences that provide for healthful school life, through: (a) The provision of a healthful environment (sanitation, mental hygiene atmosphere); (b) The school health services with physicians, dentists, and nurses, for example, serving as school medical and dental advisers and health counsellors respectively, instead of school physicians, school dentists, and nurses engaged in somewhat perfunctory jobs; and (c) The supplementary formal instruction in personal and community health carefully planned and adapted. Most important of all, the best of present-day health teaching in the school is very definitely linked or interwoven with the other phases of community health.

It behooves the public health educator then to be ready to carry on from the point where the school teacher leaves off, as well as to coöperate with school health teachers by discussing methods of health instruction, by providing materials and factual data for common use, and by demonstrating to school children the community health problems and resources. Of great importance also is a recognition of the interrelationships of educational, health, and socio-economic factors. In turn, the school personnel are increasingly comparing notes with health workers and seeking assistance from them. School administrators and teachers need to recognize more fully the importance of health supervision and instruction while the health departments need to have a better understanding of the school programs and to work more closely with those responsible for these programs.

The selection of projects and the conduct of a program that will find ready public acceptance and will lead to effective action calls for clarity in planning and adaptation to the situation. We must individualize and dramatize specific problems—tuberculosis, syphilis, maternal and infant health, and the common rules of healthy living. Even the dangers of quackery and self-medication must be brought home as menaces to the health of the individual.

Programs should be varied. General information may be continuous, but intensive campaigns should concentrate upon those phases of the program for which some definite and immediate objective is the goal, the number of these special campaigns being limited and directed at the most emergent health hazards. It will become clear that if public health education is to be effective, it must be carried out according to a carefully devised plan based upon attainable objectives and available resources. A good plan provides for the use of all instruments and methods which may be used to advantage and conserves time, energy, and money.

Before getting down to the details of determining the public health problems and the educational measures that shall be adopted to meet them, it is well to give thought to the practical details of organizing for this campaign. If the community is large enough to have a number of social agencies, there is a need for united action, and this can best be secured through the creation of some sort of coördinating body, such as a health educational council—a central group of health and welfare organization staff members who are active in the health educational projects within their respective organizations. The real value of such a working committee becomes apparent as soon as a survey is made of the agencies concerned with public health in any important city, or large county or state.

When one considers the number and diversity of agencies, each going its own way to do what seems best for the group with which it is concerned, the possibilities are evident, on the one hand, for lost motion and cross purposes, and on the other, for a concerted, effective program of health promotion. It must be admitted that there often are obstacles in the way of a successful influential central organization of health educators. Usually, the stumbling blocks are personalities, for an opinionated, self-centered executive in one agency may make difficult a coördinated program. In addition, agencies interested in a single type of project often find it difficult to appreciate the necessity of correlating their work with that of the larger field. But the value of a central council of health educators is so obvious that a tactful, determined official usually can surmount the difficulties.

8. *Friendliness and Understanding*—A sympathetic understanding by the public of the health problems, of achievements, and of possibilities produces a significant effect in relation to services and unmet needs, and stimulates a desire to enlist support for essential services. Likewise, there must be friendliness toward and understanding of objectives if individual health instruction is to succeed. Mutual understanding among the various professional groups also fosters coöperation. The final test of health education is not how much information is broadcast, but the extent to which human behavior is influenced.

9. *Fun* — We should remember the importance of relaxation for ourselves and the value of working and playing together. Are we not inclined to take ourselves too seriously?

10. *Faith* — We certainly need faith in our goal, in our associates, and in our projects that are carefully planned and that foster team work. If the public is to respond to and support our program, the task must be so well done that the people will have faith in our work. We are all working for essentially the same objectives; we frequently discuss in separate groups (e.g., printed matter, motion pictures, exhibits, personal contact, school health education) the same puzzling questions; we sometimes wonder why one group works so independently; we worry over the complexity of our task. If we are to bridge the gap between available scientific knowledge and current practices by the promotion of sound health procedures, we must enlist the interest and secure the participation of all classes of people by concerted efforts. Many problems are to be met about which information must be secured and given, by selected methods, to various types of audiences. Advance joint community planning based on constructive analyses of problems and evaluation of services will yield results. In the words of a little farmer boy who helped his mother feed the sheep at night, "If we carry the lantern together, we can all see better."

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Healthier Health Meetings*

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THE bloody but unbowed survivor of more than 500 meetings, as a speaker, and an equal number as an innocent bystander, should be able to suggest an idea or two arising out of his tribulations. I shall talk about meetings of one kind only, namely, those which are arranged for the enlightenment of the public with relation to health. As for the hardships and vicissitudes of those who go to meetings like this—they asked for them!

There is an impression among health educators, or so it seems to the guest speaker sometimes, that a mysterious deity presides over meetings, and that into her lap one need only pour the ingredients, and the result depends wholly on her caprice. One gathers the impression that most public health education meetings arise out of the sudden impulse of somebody on a committee, to have a great public mass meeting, which often turns out to be neither public nor mass. Usually the idea is deftly committed to its parent for such bringing up and sustenance as it is fated to receive. Its prenatal care is often sketchy in the extreme, consisting largely of procuring permission to use an auditorium which may be available rent-free, the selection of a date without much regard for possible conflicts, an invitation to a speaker who will come for nothing, an announcement to the newspapers, and the pious hope that somebody will be present. The aftermath is a depressing fiasco and a resolution never to have another public lecture on health—never, never, never, until next time.

It has been my pleasure to attend, as a guest speaker, many delightfully planned meetings. The credit for most of these goes to women's organizations. Women have a social touch which men lack; they can create an atmosphere of gracious hospitality even about a health education meeting. It has also been part of my duty to attempt to speak under difficult circumstances, some of which could have been avoided. Any speaker worth his salt should be able, and willing, to take care of himself under adverse conditions when they are unavoidable, but it is needless and foolish to place handicaps upon audience and speaker when a little more effort and a better understanding of audiences would greatly enhance the chances for a successful meeting.

I recall a meeting for the public, arranged in the assembly hall of a high school. The seating capacity was 1,500, the audience 150, to be liberal about it. The stage was bare except for two folding chairs, and the curtain was up, revealing the unattractive walls backstage. The gentleman who arranged the meeting did not attend; he told me later that he drove past three times without being able to muster up the courage to

* Read before the Public Health Education Section of the American Public Health Association at the Sixty-eighth Annual Meeting in Pittsburgh, Pa., October 18, 1939.

enter. A self-appointed chairman finally introduced the speaker, getting his name wrong, his identity confused, and omitting his topic altogether. Nor was his introduction adequate to clarify the sponsorship and the purpose of the meeting.

Upon another occasion, I was asked to speak in commemoration of Hospital Day. The attendance was about 125; the capacity of the hall was 1,700. This meeting was better planned in so far as the mechanics were concerned—there were flowers, a table, a rostrum, ushers, and music; but it should never have been arranged for that date. A rival hospital was opening a new wing with a great public celebration, it was bank night in the local movies, there was a night baseball game, two important lodges held their regular meetings on that evening, and a local store was staying open for the express purpose of exhibiting Colleen Moore's famous dollhouse!

For contrast, consider this picture. In the pleasant community hall of a church, a young women's organization celebrated the annual husbands' guest night. Attractive surroundings, meeting called promptly, quick business session, welcome from the pastor, some genuinely good vocal selections, the speech, more excellent music, refreshments and social hour—success! Or, in a metropolitan blighted area, a humble cottage converted into a school where a weekly forum is held. The audience, underprivileged, shabby, poor, but alert, well informed, critical. No social amenities, but efficient businesslike handling of the meeting, sent the speaker away with the feeling of a good job well done. Or the well known smooth routine of the men's noon-day service clubs with luncheon, business, introductions, "razzberries," songs, and speech—all moving to the tick of the chairman's watch and the ever-present threat of gavel on gong.

When a meeting is arranged, or a speaker is invited to a meeting regularly scheduled, mutual obligations are created, and should be observed with scrupulous care. The speaker has no right to be late, and thus delay the meeting, but neither has the organization any right to waste his time by inviting him to appear far in advance of when he will be required, unless he clearly so understands. Business sessions following dinners are sometimes necessary, but at afternoon meetings, the time of the busy speaker should be conserved (unless he is in town for the meeting only) by inviting him for the time when he is really to be put upon the program. The speaker should expect to be present either before or after the speech to meet persons who desire to speak with him individually. He should not be expected to stand through a two hour tea, meeting individually more than 250 persons who leave their seats for a moment to meet him, and then be called upon to speak for an hour while these same guests recline in comfortable chairs. Either the speech was no good—and small wonder—or the tea was too good or the chairs too comfortable, for that audience sank into a happy state of lethargy and got nothing out of the occasion except the social contacts.

When a speaker is invited for a meeting, he should be permitted to understand clearly what the conditions are under which he comes. Are expenses to be offered him or honorarium, or both, or neither? This topic is handled as gingerly as if it were something unmentionable, like syphilis in 1890. Simple frankness is the solution. Have you money to pay expenses or honorarium, or both? Then say so, and say how much; speakers who have no organization budget or other provision for expenses should not be asked unless at least expenses can be paid. Expenses plus a modest honorarium often fails

really to recompense the speaker for the time, trouble, and sometimes actual loss involved in accepting a speaking engagement. Have you no money for speakers? Say so frankly. You will be able to get excellent speakers through many organizations which maintain services for just such occasions. Their speakers serve you gladly, and will neither expect nor, in many instances, accept honoraria or expenses. But make it clear. And when you invite a speaker to dinner, send him his dinner ticket or give it to him unobtrusively before the meeting, or you may find, to your embarrassment, that he has been refused admittance by a conscientious hotel employee, or has quietly paid for his own dinner to avoid embarrassment.

Your guest speaker, if he is from out-of-town, appreciates hospitality, within reason. He enjoys neither the bleak unfriendliness of a complete letting alone, nor such a round of entertainment that he has no time for rest, relaxation, marshalling of his thoughts, or even for shaving and getting his shoes shined and his clothes pressed. Making speeches is hard and responsible work for one who works at it, and you do not want one who does not. Do not ruin the most important speech, which usually comes in the evening, by too much hospitality during the day. And do not insist on cocktails. Wise speakers soon learn that more facile speeches may result from a cocktail or two, but not sounder or safer speeches.

Do not press speakers to accept your invitation to be a house guest. A dinner or an evening is fine, and there is a pleasant compliment implicit in the invitation to make your home his headquarters. But if he politely declines, consider that he is travelling, and perhaps has been for some time. He may need quick and convenient laundry, valet or barber service available at hotels; he may have to be accessible to the press; he may wish to do considerable telephoning or telegraphing without having to put the charges on a private line. Moreover, there are obligations of courtesy devolving upon a house-guest which may be inconvenient to a tired traveller scheduled for a number of speeches and a quick departure for more of the same at the next stop.

Speakers have obligations, too. First, they ought really to have something to say. Then they ought to be able to say it.

You have all heard the time-worn tale of the speaker, droning on without reference to the passing of time, whose attention was untactfully drawn to the calendar on the wall. He is no worse than the hem-haw-hem-hum, or the er-ah-er speaker, or the mumbler, or the microphone blaster, or the microphone dodger, or the fidgeter, or the hypercritical self-deprecator who should never have ascended a platform if he is half as bad as he says he is, or the " I-came-to-listen-not-to-speak " menace who then holds forth for 20 minutes, or the introducer who makes the speaker's speech for him, or the story-teller who forgets the point, or the egotist whose vocal cords vibrate only to the first person singular, or to many another whom you have experienced. No wonder audiences hail with glee the suggestion: " If all after-dinner speakers could be laid end to end — wouldn't that be wonderful? "

Seriously and practically, I suggest for those who have public health meetings to arrange, the following advice, beginning with that of the cynic to a couple about to be married—*Don't.* Don't arrange a public mass meeting for health education unless you must, but send your speakers where the audiences are. Send them to Rotary, Kiwanis, Civitan, Lions', Chamber of Commerce, A.B.C., Women's Clubs, P.T.A.'s, study groups, college or high school assemblies, forums, professional societies—in short, to ready-made audi-

ences seeking speakers, experienced in conducting meetings, eager for program material, and assuring the speaker of an audience whose size, importance, and characteristics can be judged in advance. But if you must arrange public meetings, then perhaps the following suggestions will be helpful:

1. Select a date as free as possible from conflicts; if necessary later, cancel, but do not postpone. Speakers should be invited early. They should never break an engagement, once agreed upon, except for illness or serious emergency.

2. Select a hall conveniently located and well known, and somewhat smaller than you think you will need. Make adequate arrangements for the meeting, including a chairman (and an alternate), ushers, programs, introductory music, or other program features, decorations, lighting, and ventilating.

3. Advertise the meeting, not once, but often. Use newspapers (including pictures), radio, posters, dodgers, letters to organizations, telephone calls, and word of mouth. Put the high school band, the P.T.A. Mother singers (or other comparable groups) on the program and their pictures in the paper, so they will talk about the meeting and bring their friends.

4. Neither overload the program, nor abandon it to utter desolation. Here is a suggested program:

7:30 P.M. Doors open, ushers on job. Committee chairman on job.

7:45 P.M. Presiding officer and alternate on job (prominent lay citizens if possible). High school band or orchestra starts playing while crowds gather (we hope).

8:00 P.M. Call to order; brief statement by chairman. Program as follows: Playlet, reading or musical numbers (short, and that means SHORT). Speech (45 minutes, plus 15 minutes for questions, or one hour speech). Musical numbers (short).

10:00 P.M. (or sooner) Chairman adjourns meeting with short remarks. Refreshments and social hour optional if group is small.

5. Have all who participate in the program understand that the chairman is as tough as they come, and will positively not permit anybody to steal anybody else's time—not even that of the audience after 10 o'clock.

Some Developments in the Water Pollution Research Program of the Public Health Service*

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THE headquarters station of the Public Health Service for research in matters pertaining to water, sewage, and stream pollution, now a section of the National Institute of Health, is located at Cincinnati, Ohio. This type of research has been a gradual development of the original pollution and natural purification study of the Ohio River organized and directed by the late Dr. Wade H. Frost. The same building then occupied is still in use but enlarged activities have rendered it inadequate. An allotment of $275,000 from the general public building fund has been made for a new laboratory building, construction of which will be started on a new site as soon as agreements for acquirement of the 8 acre property are consummated and plans can be completed.

The research work in which the station is engaged is concerned with sanitary problems pertaining to the uses of water, its pollution and purification. Recently the fundamental mechanism of the biochemical oxidation of organic matter, as it functions in biological methods of sewage treatment, has been under observation. Considerable experimental work has been completed concerning determination of the rates of oxygen withdrawal from flowing water by underlying sludge deposits. A field study of the sanitary condition of the Scioto River as affected by installation of modern methods of treatment of contributed sewage has been completed. A nation-wide continuing census of water and sewage treatment plants has been inaugurated. The station is also conducting an extensive laboratory study of the sanitary condition of the waters of the Ohio River and its tributaries as a part of the pollution survey being undertaken jointly by the Public Health Service and the U. S. Army Engineer Corps.

SEWAGE TREATMENT STUDIES

The primary objective of this research has been to determine the factors that impair the efficiency of the activated sludge method of sewage purification. Exploration of these interfering agencies has led to an investigation of the basic mechanism of the biological oxidation process of organic matter in liquids and the conditions which stimulate or retard its progress. It has been found advisable to work with individual parts of the complex biological and bio-

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chemical principles comprising the activated sludge process and to study the functioning of some of these separate parts free from interference and under controlled environment, and then gradually to assemble these parts and observe the resulting effect. Following this procedure and employing apparatus developed for observing the rate of oxygen use,[1] and using pure cultures obtained from individual cells isolated from activated sludge, have made it possible to develop certain conclusions concerning the oxidation process.

The predominant type of organisms in activated sludge appear to belong to the zoögleal group of bacteria. These bacteria, when aerated in pure culture in a clear synthetic medium or in sterilized sewage, produce a growth which exhibits the characteristic properties of activated sludge such as flocculation, rapid settling, and clear supernatant with high rates of oxidation and total purification of the contained soluble organic matter.[2] Following this lead, it has been possible to demonstrate the exceedingly high rate of oxidation of organic matter effected by activated sludge in comparison with the removal rate of biochemical oxygen demand (B.O.D.) regularly observed in streams or in the dilution process. It appears that the massed or clumped zoögleal bacteria maintained by proper aeration necessary for their rapid growth, explains the high rate of biochemical oxidation obtained in the activated sludge process.[3, 4] Pursuing this line of study further, the similarity of the clarification mechanism of normal activated sludge and of that occurring with the elementary pure bacterial culture sludge has been demonstrated. Moreover, it has been possible to trace the component rates of total purification, including the oxidation rate as distinguished from those of net adsorption and synthesis of organic matter occurring in the activated sludge process.[5]

Further studies are now in progress which appear to demonstrate the close similarity in characteristics and functions of the zoögleal bacteria as obtained from activated sludge flocs and from the slime coatings of sewage sprinkling filters.

The problem of developing some practicable method for ascertaining quickly the condition of activated sludge by the plant operator has been given consideration. The B.O.D. reduction test appears to be an insensitive indicator of the change in purification capacity of activated sludge. The quantity of oxygen used per gram of suspended matter during a short aeration period of the sewage-sludge mixture was found to be a better index of activated sludge condition.[6]

Aside from devices for observing the rate of oxygen used, determination of the capacity of activated sludge for glucose removal from the substrate appears to offer some promise as a sludge index, as well as an explanation of the mechanism of removal of soluble organic constituents in sewage. Studies of the ash content of both pure culture zoögleal and normal activated sludge have indicated no definite relation between ash volume or composition and oxidation or total purification capacities.

The relationship of fungus growths of the Sphaerotilus type to sludge bulking is being studied. Our observations appear to indicate that Sphaerotilus requires very little oxygen for its growth, is therefore of small value as an oxidizing agent, and flourishes best when conditions detrimental to the normal growth and functioning of the zoögleal bacteria prevail in the sludge-sewage mixture. The previous work of Ruchhoft has been confirmed concerning the stimulation of Sphaerotilus growth afforded by carbohydrates in the sewage liquor. Results indicate that this growth stimulation is not directly proportional to the amount of mono- or di-saccha-

roses present, but is an indirect stimulus by a substance or substances present when excessive amounts of carbohydrate material upset the usual biological balance in normal activated sludge.

In research of this nature, development of suitable methods and exploration of incidental observations are generally necessary and profitable. Thus, it has been determined that the modified azide procedure [7] is of value in increasing the accuracy of the B.O.D. test in the presence of nitrites. It has also been discovered that the Winkler method for determination of the B.O.D. of river muds may be quite inaccurate owing to interference of contained substances such as insoluble sulphides with the reagents, but that many of these interfering compounds can be removed by coagulation previous to beginning the test for dissolved oxygen. Again, the dissolved oxygen saturation value of sewage was found to be approximately equal to that of clear water.[8]

STREAM OXIDATION STUDY

Experimental studies have been in progress over a considerable period designed to develop practical methods for evaluation of the capacities of flowing streams for natural oxidation of sewage and other organic wastes. Past studies have shown that the rate of natural oxidation of organic materials in solution and suspension in a natural body of water can be measured directly by the ordinary B.O.D. test of representative samples. The most uncertain element is the oxygen demand exerted by underlying sludge deposits which are not included in the water sample and are for this reason extremely difficult to measure, both as to their extent and their rates of oxidation under the conditions in which they exist naturally. Starting with the development of a rational method for calculating the deoxygenating effect of sludge deposits based upon observations of the B.O.D. of the supernatant water [9] and proceeding to the explanation of formulae by which rates of oxidation and reaeration and the trend of the resultant oxygen curve may be calculated from observations of progressive changes in the biochemical oxygen demand and dissolved oxygen content of a polluted stream [10] the results of experimental work have been presented showing the effect of various factors on the oxygen depletion and reaeration rates occurring.[11] Later direct experimental evidence on the oxidation rates of river bottom sediments now awaits critical analysis and publication. A complementary study has indicated that the rates of reaeration of sewage polluted streams, particularly when flowing at higher velocities, are materially lower than reaeration rates of unpolluted waters.[12]

SCIOTO RIVER STUDY

The evaluation of sewage treatment in definite terms of stream improvement has been the objective of a comprehensive field study of the sanitary condition of the Scioto River in Ohio during the past two years or more. The City of Columbus discharges its liquid wastes to the Scioto River. The original sewage treatment plant was entirely inadequate and obsolete and has been recently replaced by a modern one of the activated sludge type. Observations of the bacteriological, biological, and biochemical condition of the river waters and channel sediments were undertaken for a complete year throughout the 100 mile river stretch below Columbus, both prior to and following completion of the new sewage treatment works. The extensive analytical data are now being assembled and critically analyzed in preparation for publication of the results obtained and the conclusions possible to be drawn. A preliminary review of the data indicates that although the old Imhoff tank sprinkling filter plant was entirely inadequate, the effect of

this effluent on the river was not so detrimental as that discharged from the new plant when plain sedimentation only was employed during the first few months of its operation. However, when complete, activated sludge treatment was begun, a profound improvement in the sanitary condition of the stream promptly occurred. This improvement was definitely reflected in the bacteriological and plankton content and biochemical reactions of the water as well as in the animal life in the bottom sediments. Some incidental observations pertaining to stream biology and the verification of certain organisms as pollution indicators have been published.[13, 14, 15]

INVENTORY OF WATER AND SEWAGE TREATMENT PLANTS

Although the recently inaugurated continuing census of water and sewage treatment plants and stream pollution conditions throughout the United States is not a strictly fundamental research activity, it is intended to serve as a useful tool to locate problems in these fields and record progress made in their solution as well as to serve as an aid to the engineering divisions of state health departments. Work is in progress on the collection of basic data on each individual plant. As soon as sufficient data have been made available by the states, it is proposed to summarize them for publication and to revise such publications periodically. It is hoped that eventually the Public Health Service may act as a clearing house for the exchange of such information and thereby relieve the individual states of some requests for data of this nature.

OHIO RIVER POLLUTION SURVEY

Legislation enacted by the 75th Congress, first session, directed the Secretary of War to have made a comprehensive survey of the pollution of the Ohio River and its tributaries for determination of necessary corrective measures. Provision was also made for obtaining the coöperation and assistance of the Public Health Service in this activity. This survey is now in progress jointly by the U. S. Engineer Corps and the Public Health Service. To the Stream Pollution Investigations Station has been assigned the direction and conduct of all analytical work of the survey. Although this assignment is not primarily one of research, but rather one of fact finding, it does afford some possibilities of employing the assembled data for critical study. The central third of the watershed at present under observation extends from the mouth of the Kanawha at Point Pleasant, W. Va., to the mouth of the Kentucky at Carrollton, Ky., including the tributaries within this river stretch of about 280 miles, and comprises a watershed area of over 30,000 square miles. It is proposed to cover the upper section of the watershed in 1940 and the lower third in 1941.

The central laboratory for this field study is located at Cincinnati, to which point samples are brought by motor boats and automobiles from accessible main river sampling stations and tributaries. The upper section of this river stretch and tributary area is served similarly by a completely equipped floating laboratory. The fringes of the watershed not readily accessible to the two large laboratories are being covered by mobile laboratory units moving from place to place. Coincidental with the analytical work, the Public Health Service is collecting detailed data pertaining to the sources, nature, and extent of pollution contributed throughout the watershed.

A supplementary part of this Ohio River Study is an epidemiological and bacteriological investigation now in progress of the endemic and epidemic occurrence of intestinal disorders which may be water-borne. Such outbreaks of undetermined origin, are occurring with

increasing frequency, and while many of them have certain characteristics which cast suspicion on the drinking water supply, the causative factors are frequently obscure.

MISCELLANEOUS ACTIVITIES

In the conduct of any research program opportunities are always presented for exploring some interesting problems more or less directly related to the main objectives. In our bacteriological laboratories the enumeration of the coliform group of organisms in water samples comprises an appreciable portion of the routine work. The possibility of making direct counts of this group on some solid differential medium is being investigated. The results of such plate counts on duplicate samples from a large variety of sources are being correlated with those obtained by the standard methods of dilution procedure. The data thus far accumulated appear to indicate that the direct counts on brilliant green lactose bile agar are sufficiently accurate to justify serious consideration of this shortened procedure when the density of coliforms in the sample is sufficient to provide for accurate plate counts.

In the coverage of certain parts of the Ohio River watershed an opportunity was afforded to explore the plankton life existing in the acid mine waters draining from coal mines. It was found that such microscopic life was restricted to only a few specific forms.[16, 17]

The methods of preparation of plankton specimens for microscopic examination and the changes in appearance of some of them induced by formalin used for their preservation has also been the subject of a separate publication.[18] Another interesting study has been an endeavor to evaluate the contribution of dissolved oxygen supplied to water by a definite species of algae.[19]

The results of the research work of the station are generally published in the *Public Health Reports* and are usually available in the form of reprints. Certain of the technical papers pertaining to sewage research are printed simultaneously in *Sewage Works Journal* or separately in appropriate professional journals.

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Weekly and Seasonal Trends of Upper Respiratory Infections in a Group of 2,000 Students

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AN analysis of the incidence of common respiratory infections in a group of 2,000 students at the Phillips Exeter Academy indicated a characteristic weekly trend and a pseudo-seasonal trend. The data for the analysis are based on the daily health records of the Lamont Infirmary. During the period under examination, September, 1935, through June, 1939, over 6,800 colds were recorded.

We first observed that there was a rather consistent weekly cycle. We found that relatively few colds were reported over the week-end and on Wednesday, while Monday, Tuesday, Thursday, and Friday showed relatively high incidence rates. In order that the different terms * of the 4 year period might be compared on a common basis, we computed the ratio of the mean number of colds for each day of the week for the several terms to the mean incidence for the several terms. The results have been presented in Figure 1.

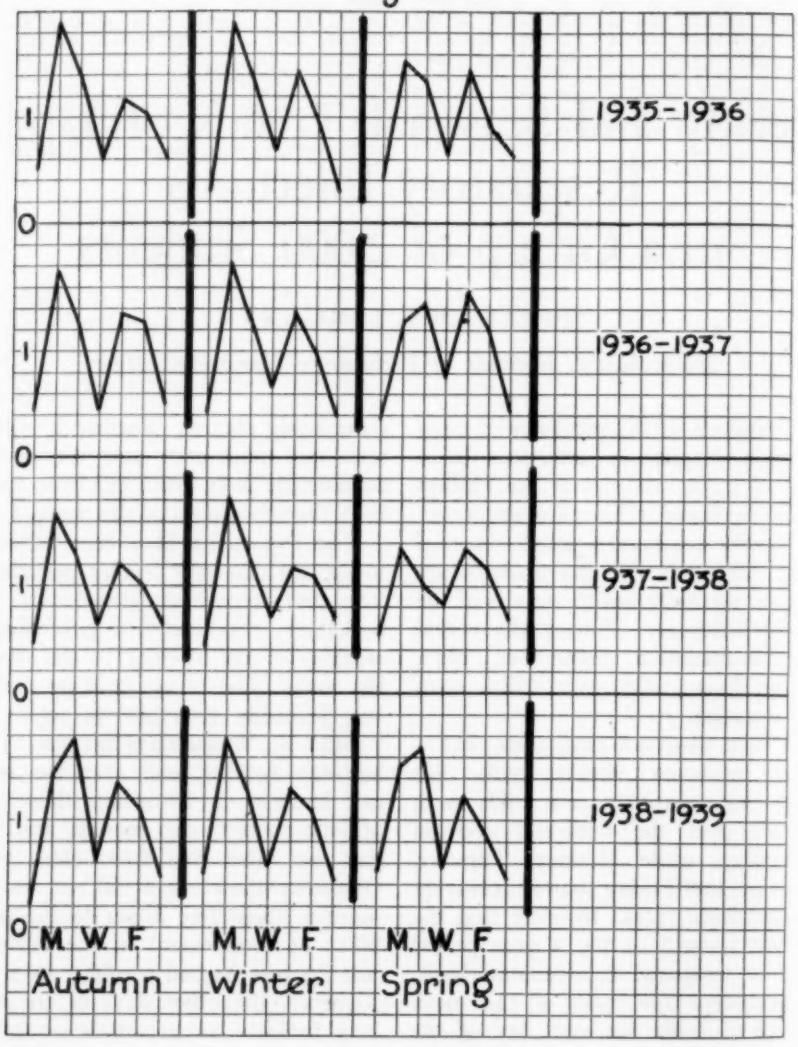
It will be noted that in general each fall and winter term has a curve differing from that of the spring term, especially during the first 3 years. In the 4th year the curves for the 3 terms are remarkably similar. Further it will be seen that week-ends and Wednesdays consistently have lower incidence values than the other days of the week.

Two hypotheses have been advanced to explain this very regular periodicity. The first hypothesis stated that this periodicity represented a psychological reaction of the student to the day of the week. The curves indicate that he was probably reluctant to report his "cold" on Wednesdays because of the half-day holiday, and over the week-end because on Saturdays there were athletic contests and movies, and Sunday was also free from class work. Obviously the student did not want to sacrifice these free hours to the possibility of confinement in the infirmary just because he had a cold. As a consequence, the other days of the week may indicate an accumulation of the colds that should have been reported sooner, plus the colds actually incurred over the week-end and on Wednesday. We have, therefore, appropriately named this weekly curve the "reluctance curve."

Yet it might be that this "reluctance curve" is autonomically influenced by a change in living habits over the week-end and on Wednesdays. Such an idea is the second hypothesis that was advanced to explain the weekly perio-

* The academic year is divided into fall, winter, and spring terms. The mean dates of these terms are respectively Sept. 21 to Dec. 17 (12 weeks); Jan. 5 to March 25 (11 weeks); and April 6 to June 15 (9 weeks).

Figure 1.



dicity. Especially over the week-end does the student change his living habits. He eats heavily and retires at most irregular hours on Saturday night. He generally sleeps late Sunday morning and then has a late breakfast and a heavy lunch within a very short period of time. This overeating and irregularity of sleeping hours might exert a definite effect on the normal biological equilibrium. Such a physiological disturbance might very well develop into a respiratory infection. A further factor is the movies. The large majority of the students sit for 3 hours in a stuffy, ill-ventilated gym, and then they go out into the cooler evening air, generally poorly clad; they become chilled, and if the chilling is severe, a cold may result. That this chilling might enter the picture in shown in Figure 1.

We see that in the fall and winter

terms the incidence is very high on Monday and Tuesday compared to the rest of the week, while in the spring the difference is not so great. In the fall and winter the temperature gradient between a warm, stuffy gym and the outside air is greater than in the spring. This gradient will cause a severer chilling, and it doubtlessly furthers the accumulation of Monday colds, especially during the fall and winter.

The spring of 1939 is of interest in this light. We noted previously that all the curves for this school year were similar. The spring of 1939 was unseasonably cold in New England, and possibly the weather factor played a part in raising the Monday and Tuesday cold level..

A further factor in evaluating the meaning of the weekly cycle is the influence of students taking week-ends (going out of Exeter to Boston or home). Since only 5 to 10 per cent of the student body, on the average, take week-ends, it was felt that they could not account in full for the low number of colds over the week-end. The change in habits and tiring trip were considered as possible factors in giving these students colds. If a large number of them returned to school with colds, the result might account for the Monday and Thursday peaks. Such a factor never contributed more than 20 per cent of the Monday colds, and the average proportion was under 5 per cent. Similar proportions were found to hold for the Wednesday-Thursday relation. It was thus clear that students going out of town contributed very little toward this weekly cycle.

The Medical Department of Phillips Andover (a school quite comparable to Exeter and in a nearby town) finds a similar periodicity and feels that it must be explained on a psychological basis. This fact seems to further the belief that reluctance is an important factor in the low incidence of new upper respiratory infections on Wednesdays, Saturdays, and Sundays. It is clear, on the other hand, that no definite conclusion can yet be reached concerning the meaning of the weekly cycle. Studies are, however, being made at the present time, and they may throw more light on it.

In Table 1 we have indicated the average monthly values of the daily incidence of new upper respiratory infections. It will be noted that the seasonal trend is not wholly consistent. That is, the maximum and the minimum periods of colds do not occur in the same months each year. For this reason we feel that the common cold has what de Rudder calls a pseudo-seasonal trend. Of course, it is by no means an extreme case, but it is, we feel, a case in point. The first 3 years have quite similar trends while the 4th year (1938–1939) has a much different one. There is a peak in December and in March. April is the

TABLE 1

Average Monthly Values of Daily Common Respiratory Infections

	1935–1936	*1936–1937*	*1937–1938*	*1938–1939*
September	8.8	5.2	6.6	6.8
October	5.4	6.2	5.9	4.0
November	6.0	4.1	5.5	4.1
December	6.6	6.2	11.6	13.1
January	*12.5*	*13.7*	*14.2*	9.9
February	10.3	11.3	11.7	9.4
March	9.0	8.2	9.7	*16.5*
April	6.8	7.5	3.0*	3.1*
May	3.8	4.5	3.9	5.8
June	2.7*	2.4*	3.8	4.2

The italicized values are the highest averages for the year, and the starred values are the lowest averages for the year.

lowest month, and it immediately follows the all time maximum.

If one examines the mean weekly incidence of the daily new colds, he finds greater variation from year to year. There occur numerous minor peaks in addition to the major seasonal periods of sickness. Both minor and major peaks are not wholly consistent from year to year, and we are consequently led to believe that a so-called normal incidence curve is not wholly reliable.

We found that the winter had approximately twice as many colds as the fall and spring terms. This fact might be related to the temperature levels at these different seasons.

In presenting these ideas, no attempt has been made to arrive at any final conclusion. We have only been interested in commenting on an observed weekly cycle and the seasonal trend in upper respiratory infections at a preparatory school.

NOTE: The author is deeply indebted to Miss Marjorie Evans and Dr. C. H. Sanford, of the Phillips Exeter Academy.

The Problem of the Gonococcus Carrier*

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CARRIERS of the gonococcus have been recognized for many years; yet even today little accurate information is available on the incidence and the duration of the carrier state. With the increased used of sulfanilamide and similar compounds for the treatment of gonococcal infection, a new importance attaches to the problem, as will immediately become apparent. Sulfanilamide therapy effects clinical recovery in many patients, but a considerable number continue to harbor the gonococcus after treatment and thereby become an unsuspected source of infection. The ability of the gonococcus to acquire tolerance for sulfanilamide is another aspect of the problem. Until recent years, studies on gonococcus carriers have not been practicable because of the unreliability of the laboratory methods available for diagnosis. An improved cultural method, now available, permits the detection of gonococci in exudates containing very few organisms and thus eliminates, to a large extent, the defects of the smear method of diagnosis.

Male and female carriers of the gonococcus have been described by a number of investigators, among them Chevallier and Schoengrunn,[1] Asch,[2] Franck,[3] and Janet.[4] David,[5] Belgodère,[6] and Wirz[7] believed that both sexes may carry the gonococcus for from 5 to 15 years. Fraser and Dye[8] reported that a case of gonococcal infection, latent for 50 years, was reactivated by prostatectomy, and Roussville and Trabaud[9] described the isolation of the gonococcus from a kidney 16 years after active infection.

The fact that many investigators have reported carriers of the gonococcus is evidence that they are not uncommon, but interesting as are their observations, all are subject to this one criticism, viz., that the information has been based upon clinical histories and upon patients' statements, which are notoriously of doubtful reliability when venereal disease is in question. The possibility of reinfection has not been eliminated in most cases. Moreover, the number of patients who carry the gonococcus and the length of time the organism may be retained in the body may have been underestimated because of the undependability of diagnoses based upon the examination of smears. Wolbarst,[10] it is true, conducted a survey in a state hospital where sexual contact was supposedly eliminated, but Franck,[11] who in a single year treated 37 male patients whom he said were infected by asymp-

* Prepared in coöperation with the United States Public Health Service and the authorities at Attica Prison. Read before the Laboratory Section of the American Public Health Association at the Sixty-eighth Annual Meeting in Pittsburgh, Pa., October 18, 1939.

tomatic females, did not exclude the possibility of other exposures. Various organs have been named as the reservoir of infection. Eastman [12] considers Cowper's glands and the verumontanum as the principal tissues in which the gonococcus persists. Young,[13] David,[5] and Belgodère [6] believe that the prostate, urethral glands, and epididymis harbor the organisms. That the gonococcus can frequently be recovered from the seminal fluid, when other exudates are negative, was emphasized by Lebreton,[14] Wirz,[7] and Roussville and Trabaud.[9]

The significance of sulfanilamide in the development of the carrier state is not yet fully understood, but there is little doubt that it plays an important rôle. Herrold and Palmer [15] studied a group of 23 symptomless patients who had been treated with sulfanilamide, and found that 12 remained positive for from 4 to 60 days after the drug was discontinued. A few other patients showed gonococci in smears for months after treatment. Pelouze [16] reported that five of his patients infected their wives after so-called sulfanilamide cure, and expressed the opinion, ". . . women infected by men improving under or made carriers by sulfanilamide medication usually become absolutely symptomless gonococcus carriers from the start. . . . During this carrier state in such patients, alcohol, sexual intercourse, and other things often fail to produce evidences of disease."

Another factor to be considered in sulfanilamide treated patients is the development of drug-fastness by the gonococcus. Many urologists believe that the gonococcus adapts itself readily to new drugs. Williamson,[17] in 1923, observed that the gonococcus developed resistance to certain drugs, and that cases of the disease responded less favorably to acriflavin after it had been in use for several years. Recent studies [18] have shown that, *in vitro*, the gonococcus readily acquires tolerance for high concentrations of sulfanilamide, sulfapyridine, and sulcamfamide when grown in gradually increasing concentrations of the compounds. This property of sulfanilamide will, no doubt, prove to be a point of great importance in view of the extensive use of the drug today.

To eliminate, as far as possible, the shortcomings of previous investigations, particularly the problem of reinfection, a study of male carriers has been undertaken in a penal institution where the inmates are under rigid supervision and the period of incarceration is long enough to make the findings significant. The State Prison at Attica, N. Y., was chosen because the facilities are superior to those of many institutions of this type, and the minimal sentence is 1 year, the average being 5 years. The incidence of gonococcal infection in male prisoners, and the length of time that men remain carriers after clinical recovery are aspects of the investigation that will be discussed presently. To detect the greatest possible number of positive cases, the cultural method has been used in conjunction with the examination of smears as a means of diagnosis.

SURVEY OF GONOCOCCUS CARRIERS IN MALE PRISON INMATES

The investigation is being conducted by members of the Department of Bacteriology of the University of Rochester School of Medicine and Dentistry, in coöperation with the U. S. Public Health Service, the New York State Department of Health, and the authorities of Attica Prison. The institution has a census of from 2,150 to 2,250 inmates, of whom approximately 15 per cent are Negroes. From 6 to 12 prisoners are admitted each week, and approximately that number dismissed or transferred. About 10 or 12 men are examined daily. The recently admitted

inmates are examined early in the week, and then those in residence at the time the study was begun are taken in the order of their admission. Subsequent examinations are made on men showing even minimal symptoms of genitourinary infection, and also on those without symptoms but from whom the gonococcus or some other species of the genus *Neisseria* is isolated.

Patients are examined individually. The past and present histories relative to genitourinary infection are recorded on a special form devised for the investigation, and a detailed examination is made of the genitourinary organs, rectum, and regional lymph nodes. Smears and cultures are prepared from urethral exudate, prostatic secretion, urinary sediment, and anal discharge, and are examined for gonococci in accordance with the methods recommended by the American Public Health Association.[19]

During the 9 months that the investigation has been in progress, 1,061 inmates have been examined. Of 937 whites, 330, or 35 per cent, admitted having had gonococcal infection, and of 124 Negroes, 62, or 50 per cent, gave a

TABLE 1

Data on 11 Gonococcus Carriers among Male Prison Inmates

Case No.	Date of Gonococcal Infection	Therapy	Date of Admission to Prison	Period of Incarceration at Time of Examination	Clinical Signs and Symptoms of Gonococcal Infection	Laboratory Findings: Smears P*	Smears U†	Cultures P*	Cultures U†	Duration of Proved Carrier State
224	1934			3 wk.	Hesitancy at start of urination.	—		+	+	
	Dec. 1938		12/23/38	9 wk.	Moderately enlarged prostate.			+	+	9 wk.
363	1935	Chemical; vaccine	7/ 4/37	1 yr., 28 wk.	Slightly enlarged left epididymis.	—		—		
				1 yr., 29 wk.	Moderately enlarged vas deferens.	—		—	+	1 yr., 29 wk.
				2 yr., 2 wk.	Nodular prostate.	—		—	—	
371				2 yr., 28 wk.	Moderately enlarged prostate. Slightly	—		+	+	
	1935	Urethral irrigations	8/ 7/36	2 yr., 39 wk.	enlarged left Cowper's gland.	?		+	+	3 yr., 1 wk.
				2 yr., 46 wk.	Urethral exudate positive for gono-	—		+	+	
				3 yr., 1 wk.	cocci in smears and cultures.	—		+	+	
522	1937	Chemical;		7 wk.	Slightly enlarged prostate.	—		—	+	
		vaccine.	2/ 1/39	24 wk.	Occasional "morning drop."	—	—	+	—	28 wk.
	Aug. 1938	Self-treated		28 wk.		—		+		
524	Denied		12/ 2/38	16 wk.	Firm, moderately enlarged prostate.	—		—	+	30 wk.
				30 wk.	Slightly enlarged seminal vesicles.	—	—	—	—	
668	3 attacks:	Sulfanilamide	12/26/38	17 wk.	Enlarged prostate, left epididymis,	—		—	+	
	Latest:	vaccine		27 wk.	and left vas deferens. Occasional	—	—	—	—	17 wk.
	June, 1938			34 wk.	sharp pain in left testicle. Slight	—		—	—	
					urethral burning. Lumbar ache.					
					Occasional "morning drop."					
670	1920	Urethral irrigations, Oral medication.	12/10/30	7 yr., 8 wk.	Urethral exudate. Stricture of anterior urethra. Purulent urethritis developed after sound was passed.	+‡		+‡		7 yr., 8 wk.
884	1935			6 wk.	None	—		+	+	
	May, 1939	Sulfanilamide	5/27/39	11 wk.		—		—	—	6 wk.
891	1915	Local irrigations.	4/26/39	11 wk.	Moderately enlarged prostate.	—	—	—	+	11 wk.
				16 wk.		—		—	—	
934	Denied		12/13/37	1 yr., 35 wk.	Slightly enlarged epididymis and vas	—		+	+	1 yr., 40 wk.
				1 yr., 40 wk.	deferens.	—		+	—	
1,007	1924		12/20/36	2 yr., 34 wk.	None	—	—		+	2 yr., 34 wk.

*P = prostatic secretion; †U = urinary sediment; ‡ = urethral exudate
All of the 11 carriers are white.

positive history. Not a single case of acute infection has been observed to date. Eleven carriers of the gonococcus have been disclosed, all of whom are white. Three patients, Nos. 522, 668, and 670, had symptoms of gonococcal infection, and 8 presented clinical evidence of the disease.

Neisseria gonorrhoeae was isolated in culture from each carrier. Smears were negative in every instance, except one. The cultures were recovered from various sources: in one patient from urethral exudate, prostatic secretion, and urinary sediment; in 4 patients from prostatic secretion and urinary sediment; in 5 from urinary sediment only; and in 1 from urethral exudate only. Strains of *Neisseria pharyngis sicca* and *Neisseria catarrhalis* have been isolated from the genitourinary tract of 2 of the carriers and 13 other men. Physical examination revealed no anatomical or clinical findings that explained why the 11 carriers continued to harbor the gonococcus. The longest proved carrier state was 7 years and 2 months. Information pertaining to each of the carriers is summarized in Table 1.

DISCUSSION

The length of the carrier state, in the current survey on male inmates, is based upon the time elapsing between admission to prison and the date of examination. While this is shorter than the actual duration of infection, the data, for obvious reasons, are valid only for the period that reinfection is known not to have been possible.

Infection by extra-genital or homosexual contact in the prison has been considered, but is extremely unlikely. During the day an adequate number of guards supervise the men, and at night the prisoners are confined in individual cells, each equipped with toilet and wash bowl and separated by solid sheets of steel. A sentence of 5 years' imprisonment added to the original penalty is a further deterrent to such practice. Sexual excitement, such as masturbation, over which there is no control, may be an important factor in the development and prolongation of the carrier state.

The discovery of 11 carriers, representing 2.8 per cent of the men with a history of gonococcal infection, or 1 per cent of the inmates examined, is lower than might have been anticipated. These data are, of course, too few to allow generalizations to be made.

It is interesting to note that 7 of the 11 carriers continue to harbor the gonococcus notwithstanding intensive and long continued therapy, and that all of the commoner types of therapy are represented, including sulfanilamide.

In only one instance in the survey was a smear found to be positive for gonococci. It was prepared from urethral exudate. This clearly indicates the importance of cultures in the examination of chronic cases of the disease, and especially in the detection of carriers. In some cases the gonococcus was not recovered at every attempt. Whether the negative results in Nos. 363, 524, 884, and 891 indicate that the patient is cured, or whether subsequent examinations will reveal that the organism can be isolated only intermittently, as in case No. 668, cannot be stated at this time. The patients will be followed until a series of negative results indicates that they no longer carry the gonococcus.

The control of gonococcal infection in a population is dependent, to a large measure, upon accurate epidemiological information. It is essential, therefore, that further investigations of the present type be carried on in various parts of the country, among women as well as men, and especially among Negroes, in whom the incidence is thought to be high. Information on women as car-

riers is meager. Although the incidence of gonococcal infection is lower in females than in males, there is a greater possibility of women retaining the gonococcus. The anatomical structure of the genitourinary tract provides an ideal reservoir for the organism, and not infrequently the infection remains occult. Because of the mildness of the disease in women in many instances, it may even be untreated.

The importance of accurate laboratory methods of diagnosis cannot be overemphasized. Notwithstanding the shortcomings of cultures, they have proved to be far superior to the examination of smears for the detection of carriers. The two methods, however, should be used in conjunction. Training the physician and the health officer to appreciate the fact that negative smears are not sufficient evidence that the patient is free from infection, and that a reliable test for cure is dependent upon the use of the cultural method, is of importance. The practitioner must be taught how to collect specimens and submit them to the laboratory in a satisfactory condition. Well trained technicians and adequate laboratory facilities are likewise essential for the success of the laboratory examination.

In 1937, Dr. Parran stated, ". . . at the present time an exact determination of the period of communicability for gonorrhea is not possible, and the need for clearing up this point is so important that we might well concentrate all our efforts on it." We believe that with our present facilities and laboratory aids, the first part of the statement is no longer true, and that a determination of the period of communicability of gonococcal infection is possible. However, we concur in his statement that this point is so important that those concerned with the control of the disease might well concentrate their efforts upon solving it.

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Staff Education Through a Study of Malnutrition in School Children*

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ALTHOUGH long recognized as a definite need in health departments, and carried on in a minor way in some instances, "in-service" training or staff education has received a new impetus in recent years due particularly to aid furnished by Social Security funds. With this assistance the New York City Department of Health has for 2 years maintained a special staff training project under a full-time faculty. These activities have been recently reported upon by Baumgartner.[1] The special application of in-service training to the school health service is the subject of this presentation. As a vehicle for one phase of our staff training of school physicians, a study of malnutrition among school children was chosen. This work has yielded definite benefits to the staff and new insight into the procedures for dealing with children characterized as undernourished in the school examinations.

NEED FOR STAFF TRAINING OF SCHOOL PHYSICIANS

Up to recent years the attitude among school physicians generally has been that their primary function was to examine a child and record the findings. Several years ago, three-fourths of the school physicians in the New York City Department of Health expressed this point of view. Only 4 out of 108 who were questioned even mentioned that the physician might serve as an adviser in the school; 24 mentioned education of the child, and 22 stated education of the family, as other functions that the physician might perform in his capacity as school physician.

One major weakness in the school examination as it was being conducted was the lack of emphasis placed on the child's medical history. When the parent appeared for the examination, the nurse generally conferred with her and took a routine type of history; however, this information appeared to have little practical relation to the physical inspection by the physician. One physician remarked that mothers "asked too many questions," and some complained that the presence of the parent "slowed up" the examinations. In some instances the nurses were requested by physicians to discourage mothers from coming to the examination because of their retarding effect on the number of children who could be seen in a morning. This is the absurd result of too much emphasis on quantity in examination. Disregard of the evidence which the child's medical history affords certainly decreases the accuracy of case selection. Statistics of defects among school children based on such inspection have little public health

* Read at a Joint Session of the American School Health Association, and the Food and Nutrition and Child Hygiene Sections of the American Public Health Association at the Sixty-eighth Annual Meeting in Pittsburgh, Pa., October 17, 1939.

significance. Moreover, this kind of school medical service is not in step with modern medical practice.

A new point of view is emerging as to the rôle of the school physician. Instead of being merely a medical inspector, his greater opportunity comes in being a medical adviser in the school. To give good advice the school physician needs to know more about the child and the family. Thus emphasis on history improves his ability as a diagnostician and as an adviser in health matters. This does not mean providing medical treatment. It means that the school physician must assume professional leadership with parent, nurse, and teacher in recognizing and planning the follow-through for health problems. Only in this way can he contribute to health education in the medical examination. Unless this is a part of the school examination, his service is sterile.

How to imbue our school medical staff with this new point of view was the problem. It could not be settled simply by an administrative order. To implant in the minds of the staff the reasonableness of a new and different approach and to instill a willingness and desire to proceed on this basis were fundamental problems which the staff education program had to undertake.

MALNUTRITION CHOSEN AS VEHICLE OF TRAINING

It was because the method of handling the child diagnosed as "malnourished" demonstrated most strikingly the defects of the medical examination, that the problem of the undernourished school child was selected. Pediatricians (Holt,[2] Smith,[3] Wile[4]) and nutritionists (Roberts[5]) agree on the complexity and interrelationship of the factors which produce the child called "malnourished."

In spite of this, school procedures still relied upon physical inspection to select children with malnutrition. No provision was made for the physician and nurse to gain insight into the child's habits and environment before follow-up was started. Lacking any better knowledge about the individual, the stock recommendation was "diet and rest." This was the answer of the school health service to the problem of malnutrition.

Here was a problem with potentialities. Its study appeared to offer the dynamic method of approach needed to change attitudes about the school service. If given the opportunity to visit the home to obtain a pediatric case history from the parent and to examine the child, a school physician could gain: (1) an appreciation of the complete child; (2) recognition of the value of symptomatology in the diagnosis of physical defects of school children; (3) a knowledge of home environment as it relates to the health of children; (4) recognition of the importance of rapport with the parent for a knowledge of the child and for planning follow-up care; (5) realization of the necessity of making recommendations pertinent to the needs of the individual child. On the basis of this experience an improved method for handling the problem of malnutrition in the school examination could be developed.

STUDY PROCEDURE

As a teaching device, this investigation had the following advantages: (1) flexibility, by permitting any number of physicians to participate; (2) stimulation of interest through the investigative and creative aspect of the work; (3) addition to knowledge about the problem of the malnourished school child; (4) sound education, since it is the application of the axiom—"to learn by doing." The problem set for the school physicians was an investigation of the malnourished children being carried in school medical files. The in-

formation was obtained by case histories taken from the parent in the child's home. One hundred and sixty physicians participated in this study during the summer of 1938. To develop a supervisory staff for this large number of field workers, 30 physicians were released from their routine assignments for intensive preparation during June. The pediatrician in charge of the program worked closely with these 30 physicians. This supervisory staff, by field work, tested and revised the questions to be asked by making home visits, and also assisted in working out details of procedure. This training for the supervisory staff was a valuable experience in itself, both to the director and the physicians, because of the close working association. Some of the physicians showed considerable initiative in the organization. By the end of this preparation a guide for conducting the interviews had been written, which was given to each field worker. The entire staff was brought together several times for general instructions and talks by qualified speakers on nutrition subjects. The 30 physicians-in-charge each had 4 or 5 physicians under his supervision. During the operation of the study, local meetings were held by these small groups in the field each week to discuss the case histories before sending them in to the central office.

OUTCOMES OF THE INQUIRY

This democratic process, with its use of problems, group discussion, and group planning, is undoubtedly slower in formulating and in putting new procedures into operation, but the benefits to the Health Department and to the individual staff member are more substantial.

The immediate results of this educational experience appear to be: (1) an appreciation by the school physician of the information to be derived through conference with the parent and a visit to the home of certain groups of school children; (2) an increased emphasis by the physician in regarding *all* children whom he meets in the service as individual problems; (3) a store of useful information regarding the general health, living conditions, dietary and health habits of more than 5,500 below-par children.

Of the 5,593 children visited, 2,343 were boys and 3,250 girls. Since the group was selected on the diagnosis of malnutrition, it was of interest to find that there were 900 more girls than boys in the study. The elementary school registration is approximately 411,000 boys, 397,000 girls, a preponderance of 14,000 boys in the city-wide school registration. The physicians visited the homes of 5,030 white and 550 colored children. The latter were for the most part in the Central Harlem and Bedford Health Districts. More than half of the children had one or both parents who were born outside of the United States. This is not strange since New York City has a larger foreign born population than the country as a whole. According to the 1930 census figures, 73 per cent of New York City's population is immigrant or first generation foreign born, whereas the figure for the country as a whole was 31 per cent. The largest single nationality represented was children with Italian born parents. The physicians visited 1,561 of these children, more than 25 per cent of the group. The Italian representation in New York City is 15 per cent of the population.

When the physicians considered the rental, occupation, and size of the family in judging the economic status, approximately three-fourths of the families were in the low income group. This judgment has more significance when one considers the reports on living conditions. About two-thirds of the children visited lived under crowded conditions. This figure is based upon the

number of rooms per person. Actually 3,319, or 62 per cent, of the children lived in families where there was one-half room or less per person. Two-thirds of the children were sleeping with one or more of the family. Sixty-two per cent lived in cold water flats, contrasted with the figure of 21 per cent which is given for all families of New York City.* All but two of the families were said to have toilets, but 25 per cent were sharing the toilet with another family, contrasted with 10 per cent of the families of New York City who share the toilet with another family.* The selection of this group was made on the basis of the school physician's diagnosis of malnutrition, and children from all sections of the city were included.

The physicians failed to mention temperament in one-third of the children. This suggests that the school physician gives inadequate consideration to the emotional makeup of the child and the importance of rest to the child's health. This type of information is useful for future staff education. When the temperament was mentioned, 90 per cent of the children were described as overactive, with only 7 per cent as normally active. The reliability of this information may be questioned. Mothers are prone to describe the normal motor activity of a child as excessive. One can imagine in many of these crowded homes, almost any activity to an overworked mother might be described in exaggerated terms. The thin, fussy, restless type of child is considered by many to be a malnutrition problem.

Forty-three per cent of the children had bad eating habits. This included dawdling or lingering over meals, forced feeding, frequent eating between meals with associated poor appetite, sweets between meals, and marked likes and dislikes of the usual foods. Close to 50 per cent of the children were described as having poor appetites.

A major finding was that in 4,180 or 75 per cent of 5,580 in which it was evaluated, the diet was inadequate.* In giving the cause for the inadequacy, poverty of the family or ignorance of dietary essentials by the parent were not the most frequent causes. Bad eating habits of the child appeared more frequently as a single factor or in combination with poverty and ignorance. Since two-thirds of the children were in families of low economic status and were living under crowded conditions, one might have expected a ready answer to be poverty.

It was the physician's belief that in more than half of the children, the type of body build of members of the family was related to the child's physique, and so was a factor in the physical appearance. In 6 per cent of the cases no other basis for the diagnosis of malnutrition was found. If this decision had been made at the routine school examination, valuable time and follow-up might have been saved. There is not much the school can do about inherited growth factors, except to recognize them when they exist. When the physician's appraisal of the child indicates that a slender body build is inherited, mere slenderness should not be a basis for selection of the child as having a physical defect.

Lack of understanding of child management was the next most frequent contributing cause of poor condition. An illustration of this educational problem is seen in the frequency of bad eating habits as a contributing cause of inadequate diet. This problem

* From Real Property Inventory of New York City, 1934. Information submitted by the Welfare Council Statistical Bureau.

* Evaluation of the diet was made on the basis of a "yardstick" for a minimum diet. This basis for judging the diets was prepared by Pauline Murrah, Nutritionist for the Health Department, who also assisted in preparing the physicians by giving several lectures.

should be handled through education of both parent and child. Stuart [7] has emphasized this aspect. He says: "We must try to develop in our child population attitudes toward food and habits of eating. . . . We must concentrate our educational efforts on the early ages."

Several conclusions from a study by British investigators [8] have a bearing on this work. Between 1919 and 1923 an investigation was made in Glasgow, Edinburgh, and Dundee, to determine the influence of various parental and environmental conditions upon nutrition. It was concluded that "heredity and the inherited growth impulse play no small part in determining the growth of the child." The only significant correlation in the careful statistical analysis of environmental factors was between the nutritional status of the child (expressed in terms of height and weight and general health) and "maternal efficiency" (judged by the tidiness of the home and the care children in the home received). Maternal efficiency was an important factor in the problem of growth and development, which a simple increase of income would not improve.

Education suggests itself as a more promising method of improving "maternal efficiency." Certainly when the mother lacks specific information on how to get medical care, the school service can help maternal efficiency. When the mother lacks understanding of simple facts about diet, rest, or child management, the school service can improve maternal care.

Recommendations based on the interview involved health education of the child and of the parent more frequently than any other single recommendation. Very few recommendations for social aid were made, in spite of the need for some assistance which frequently appears in the description of the child and his environment. Although it is possible that most of the families were already getting adequate help, the fact that no recommendations were made suggests a need in the education of school physicians. The physician should know enough about the operation of social agencies to know what steps to take in order to obtain social assistance for special needs of children and families. Thirty-two hundred and twenty-three children had social conditions as a factor in their situation, yet recommendations involving social and economic adjustments were made for only 716. These recommendations in most cases lacked insight into the fundamental social problem, but were confined to palliative measures such as more financial aid, more beds, or a school lunch for the child. There were few recommendations made by the physicians which indicated they recognized the need for actual social service case work.

A NEW PROCEDURE

A practical outcome of this experience is a new procedure for the handling of this malnutrition problem in the routine school work. This is now carried out in the New York City school health program and calls for a rapid screening by the school physician of any child referred through the teacher or nurse because of a below-par condition. Criteria used by teacher and nurse for such a condition are failure to gain, loss of weight, thinness, pallor, fatigue, or other signs which indicate a child is not functioning at his best. If the school physician confirms the judgment of the teacher and nurse, provision is made for a careful history and physical examination to be done by the physician *with the parent present*. Only after this type of examination is the physician expected to render judgment on the child's health status. At this time the physician and nurse plan a follow-up program with the parent for the individual child, and

this information is communicated to the teacher.*

This method of handling the problem was suggested independently by about 50 per cent of the physicians who responded to a questionnaire at the end of the summer study. A new term for such malnutrition suspects has been introduced, in the light of the summer nutrition study and subsequent discussion on this experience—"below-par." It is a broader term which directs attention to other influential factors in child growth and development. Six months elapsed from the beginning of the Summer Nutrition Study to the drafting of the new procedure for handling below-par children in the school medical service. An administrative order could have set up this new procedure overnight. An order, however, to 160 school physicians and 600 nurses will not change attitudes and give new meaning to routine school performances.

EFFECT OF THE STUDY ON THE ATTITUDE OF SCHOOL PHYSICIANS

This study is not presented as a contribution to the science of nutrition. It is the report of a successful method of staff education. Two by-products of this method have been described: (1) Useful information regarding the health and living conditions of malnourished children. (2) A new procedure for below-par children in the routine school work. This technic of using the study of an interesting problem in order to effect changes in attitudes, can be used profitably with a small staff or with a large organization. It is not new as an educational device, but it is timely to indicate it as a method which can be used by those engaged in public health staff education. The strongest evidence in support of the successful solution of the problem of staff education is the statements of the school physicians who participated in the malnutrition study. It is apparent that the staff found the work interesting because they were learning something new. One physician [8] published a most interesting and readable account of the diet and customs of a group of East Harlem families which had been visited.

* This information goes to the teacher on the pupil's individual Health Card which contains space for physician and nurse recommendations to teacher.

SUMMARY

Important results of the study lie in the valuable material obtained for future educational work with the staff, with parents and children, with teachers, and with community treatment resources.

This type of investigation has made it possible to put new emphasis on the school medical examination. It is an emphasis which stops not at the school medical inspection but calls upon the physician to use all his professional skill to recognize the need for medical attention, and to make the best use of his understanding of the problem to plan for care. These are principles of modern medical practice which are adaptable to public health service.

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THE PUBLIC KNOWLEDGE OF VENEREAL DISEASE

THE effort to get a law which adequately protects the public against adulterated food and drugs through Congress should still be fresh in our minds. Long before that we had the heroic fight made by Dr. Wiley. His experiences during that struggle for the benefit of mankind seem unbelievable. Between Dr. Wiley's time and the passage of the Federal Food, Drug and Cosmetics Act, many articles in both the scientific and the lay press have been written as well as a number of books, many of which have been reviewed in our columns.

In view of history, one would not expect to find such naïveté as is expressed in a recent article: "In the meantime intensive and increasing public education, it was thought, had reached a point where ignorance and credulity might be expected to be approaching a vanishing point."[1] The campaign against syphilis particularly has for several years past designedly attracted a great deal of attention to the venereal diseases. Some states have passed laws requiring examination before marriage. The lay press gives wide publicity to such requirements. Even the radio has modified its attitude. Everything has conspired to attract attention to the venereal diseases and it would be beyond human nature for the ghouls who fatten on the suffering of mankind to be blind to this awakened interest and the opportunity it affords for pushing their wares.

The exploitation of the sick is as old as time. The exploiters do not spare those suffering from the worst diseases or even the dying. In 1939 a survey was made[1] to evaluate the situation as regards illegal and unethical practices regarding the diagnosis and treatment of the venereal diseases, and to determine the extent to which public education has been effective in guiding the man on the street. Necessarily such a study took in drugstore prescribing without proper diagnosis. The results were discouraging and sickening.

The survey covered 35 cities in 26 states. Of 1,151 drugstores, 62 per cent were in the habit of diagnosing the disease and selling remedies alleged to cure syphilis and gonorrhea, while 31 per cent did not attempt diagnosis but stocked and sold bottled remedies. Only 7 per cent refused to diagnose or sell remedies. A good word must be said here for the national drugstore chains, most of which

sell the better known nostrums, but only on request, the statement being that managers have specific instructions from headquarters on the matter and are taught that " . . . the safest and surest way is to go to a doctor."

Among the countless preparations are some containing the newer drugs like neoprontosil and sulfanilamide, well known to be dangerous except under expert advice and administration. Certain states have passed stringent prohibitions against selling or dispensing sulfanilamide without a prescription. The Food and Drug Administration of the Federal Food, Drug and Cosmetics Act now in effect recognizes that when sulfanilamide and preparations containing it or related compounds are sold indiscriminately in a way which constitutes danger to health, when found in interstate commerce, are actionable.

The story of the prescribing and sale of nostrums is an old and sickening one. Have we improved or have we deteriorated? A similar survey was made in 1933 by the American Social Hygiene Association, and while over different territory, the results may be compared with those obtained in 1939. In 1933, 51 per cent of the managers of drugstores studied were counter-prescribing, 17.5 per cent did not diagnose, but did sell remedies on request, while 32 per cent refused to diagnose or sell remedies. In 1939, 62 per cent were counter-prescribing and 31 per cent sold remedies on request, while only 7 per cent refused to diagnose or sell remedies—a rather marked change for the worse.

In an attempt to find out what the man on the street knows and thinks on the treatment of syphilis and gonorrhea, 1,156 men in all walks of life were met casually, and in the course of general conversation, questioned as to where one could go for treatment. Of these, 65.4 per cent advised a drugstore remedy or self treatment, while 34 per cent said, " Go to a good doctor or clinic "; 3.2 per cent did not know, or gave no advice. In 1933, however, 2,175 men were similarly questioned, of whom 57.3 per cent gave advice to go to a drugstore for remedy or self treatment, and 3 per cent gave no opinion.

It appears from this comparison that in spite of the educational campaign against syphilis and venereal diseases that has been carried on, a considerably smaller percentage of the men on the street gave good advice in 1939 than did in 1933. Apparently the man on the street knows less in 1939 than he did in 1933 about where to go for diagnosis and treatment—certainly a discouraging finding. Popular education along these lines at least does not seem to have been efficacious, and there is still before us the enormous task of teaching people where to seek qualified medical care in general and for the venereal diseases in particular. In one respect improvement was noticed. Accurate figures do not exist, but there seems to be less advertising of quacks and nostrums, and the type of notice is not so flagrant as formerly. Everywhere reputable papers are refusing such material, though there is still too much in otherwise clean sheets, to say nothing of those which cater to the ignorant.

The amount of money spent for drugstore remedies and self treatment of the venereal diseases each year is not known. It certainly must run to tens of millions of dollars. The volume of advertising in newspapers and magazines, the number of quacks and charlatans who are in business, all indicate that there is an enormous amount paid for this vicious racket.

In what respect have our methods been faulty since they have failed to produce the desired results?

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ERNST ABBE
1840–1905

THIS year marks the 100th anniversary of the birth of Ernst Abbe to whom the world is indebted for the development of the modern microscope.

He was born on January 23, 1840. He early showed such ability that he was sent to the Universities of Göttingen and Jena, and when 23 years old was made lecturer on mathematics and physics in the latter university, to which he was attached throughout his life. In 1866 he became associated with Carl Zeiss as optical adviser, an event of outstanding importance in the development of optics, and which soon made Zeiss the leading manufacturer of microscopes in the world.

In 1878 Abbe worked out the computation of the homogeneous immersion lens at the instigation of J. Ware Stephenson, and Zeiss produced it. His condenser is universally used. The combination made the development of modern bacteriology possible.

His studies on optics and the theory of the microscope showed the necessity for optical glass of relatively different refractive index and dispersive power. He persuaded Otto Schott, who began experiments on optical glass in 1881, to move to Jena. More than 50 glasses were made and tried, with the result that in 1886 the most nearly perfect objective yet devised, the apochromatic, was produced by Zeiss, which, with the compensation ocular, also the work of Abbe, remains today the best combination known for visual microscopy.

The sciences of bacteriology and medicine owe more to Abbe than can be expressed in words. Abbe was absolutely unpretentious, a scientist in the highest sense and apparently devoid of personal ambition. Though reserved, he was approachable. He never had the general recognition which his scientific attainments and accomplishments warranted.

UNREASONABLE FEAR OF LEPROSY

ALTHOUGH nearly every textbook on medicine and nearly all special articles dealing with the communicability of leprosy carry a statement to the effect that prolonged and intimate contact is necessary for the transmission of the disease, there remains, among the medical profession generally a fear of the risk involved in even slight contact with a leper—an anxiety which is almost incomprehensible. This being true, perhaps it is not difficult to understand the even greater distrust among the general public. Furthermore, this dread is less in areas in which there is a real risk than where there is no risk, or only the most remote possibility of spread. The fact is not sufficiently well known by physicians, nor even by health officers, that in the United States the disease, with extremely rare exceptions, is communicable only in certain of the Gulf Coast states; elsewhere in the United States the probability of transmission is so remote as to be negligible from the public health point of view. There are examples of lepers suffering from some complicating conditions being refused admission to northern hospitals located in areas in which the danger of transmission of leprosy, even by prolonged and intimate contact, would be practically nonexistent.

In refreshing contrast to this attitude is the very sane view taken by health authorities in New York State. Not long since, a physician with extensive experi-

ence in the clinical and public health aspects of leprosy, by invitation of a local medical group in that state, gave a public clinic for physicians and medical students, using for clinical demonstration two lepers confined to a local hospital. The clinic was given local newspaper publicity without arousing any adverse comment. Contrasted with this is the action in a middle Atlantic state which used armed force to seize and to remove a leper from that state—a state in which no case of leprosy had ever originated and probably none ever will originate.

While the attitude of the general public is doubtless a heritage of Biblical times and therefore to some degree understandable, there is no excuse for health officers adopting this stand nor for participating in it; they know, or should know, that so far as the greater part of the country is concerned, there is no appreciable danger of the transmission of the disease, and even in areas in which it is endemic the danger is very small—aside from family contacts.

Even in the endemic foci there is no need for hurry in isolating a person suffering from the disease when perhaps for years he has been exposing his associates, possibly while the disease was in that stage of progress which made him a much greater menace then than he is at the time he is discovered to be a leper.

It is to be said that some physicians familiar with the disease consider it proper to advise patients to remove to an area in which health authorities are sensibly tolerant, or even to remain in self-imposed isolation at home.

TUBERCLE BACILLI OF THE BOVINE TYPE IN SKIN LESIONS

THE infection of man by tubercle bacilli of the bovine type and the distribution of the lesions produced by them continue to excite a deserved interest. The matter is one of continuous study in certain countries, England for example, and in others of more or less isolated investigations and happenings.

One of the latest comes from stricken Poland, and bad as the conditions there are described as being, we may confidently expect them to become worse, for a time at least. A limited investigation of the skin types of human tuberculosis has shown a very high prevalence of the bovine type in Western Poland,[1] and the author says that according to his observations the bovine type is more frequent in skin tuberculosis than in any other organ of the body. From 20 strains isolated from several types of skin lesions, 4 were distinctly of the bovine type, while 5 were of atypical character and are believed to have been, at least in part, bovine organisms modified by their environment. Lack of facilities prevented a complete study of these cultures as to virulence, which would probably have increased the percentage of cases due to the bovine type of organism.

That long residence in skin lesions may modify the virulence of the tubercle bacillus is borne out by other studies on lupus.[2] Of 25 cultures isolated from the skin lesions, 21 were human, 3 bovine, and 1 dysgonic human. Of these, 12 were much attenuated, 8 only moderately virulent, and 5 of full virulence, of which 3 were human and 2 bovine. The most attenuated strains were isolated from patients whose histories showed they had suffered longest from lupus and the authors suggest that the virulence was progressively lost during the long residence in the skin. On the other hand, attempts to lessen the virulence of the bovine bacillus by long culture have been unsuccessful, and types isolated from calcified intestinal lesions have in all instances that we know of been fully virulent.

Lupus vulgaris is the most frequent form of skin tuberculosis in Poland, over 80 per cent of the cases being of that type. Estimating the number of cases in Poland from the records of several large dermatological clinics, there are some 25,000 cases of lupus in that country, and further researches on the types of organism causing them are indicated for effective control of this disease.

The cattle in Poland have a rather high per cent of tuberculosis, though correct figures are not available. However, 30 per cent of virulent tubercle bacilli have been found in the market milk of Poznan, and in Warsaw 50 per cent of the market milk is contaminated with the tubercle bacillus. Considering these figures it is not surprising that any or all types of tuberculosis are found to be prevalent.

We in America are fortunate in respect to bovine tuberculosis, as in so many other ways. The campaign against this disease, which was a gigantic task, has been successful beyond what to many of us seemed possible. It was begun along very unwise lines which threatened failure, but we profited by the early experience and, under the guidance of competent men, and especially of our Bureau of Animal Industry, bovine tuberculosis is under good control. Due to this and to the increased use of pasteurized milk, the human manifestations of the disease are now rarely seen.

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BOOKS AND REPORTS

Ways to Community Health Education—*By Ira V. Hiscock, B.A., M.A., C.P.H. New York: The Commonwealth Fund,* 1939. 306 pp. Price, $3.00.

In writing this book Professor Hiscock had the collaboration of Mary P. Connolly, Marjorie Delavan, Raymond S. Patterson, and William H. F. Warthen. As the coöperative project of various experienced people, it takes particular recognizance of the importance of community organization for health education. General principles which should be the basis of any public health education program are treated comprehensively, from both the theoretical and practical points of view.

In the first section there is a consideration of objectives, fundamental principles, and administrative policies for health education, not only for the public as a whole, but also for specific groups within the community. The authors clarify their points by the liberal use of illustrative examples of actual situations.

A large section of the book deals with the various media with which the health educator should be familiar. The technics are discussed in such detail that the reader seeking specific information concerning any of these tools may use it as a practical handbook.

In the latter part of the volume there is a correlation of the technics and methods of application into a functional approach to the solution of the major problems now confronting workers in the field of public health. This section includes material on campaigns against diphtheria, tuberculosis, and syphilis; programs for promoting sanitation, and the various other important phases of personal and community health.

Throughout there is a wealth of illustration—both verbal and pictorial. It is written in a clear, forceful, and interesting style. The extensive references for further reading at the end of each chapter are particularly useful.

The book fully achieves its stated purpose, in providing "some necessary equipment to meet the rapidly growing need for special preparation in the art and science of public health education." It is another step forward in this relatively new professional field, and is a further indication of the place that health education has made for itself in the public health family.

C. E. TURNER

Mineral Metabolism—*By Alfred T. Shohl, M.D. New York: Reinhold Publishing Corp.,* 1939. 384 pp. Price, $5.00.

This book was written for readers with a background of biochemistry and was not prepared primarily either for the specialist, or for the neophyte. It is a summary of "the rôle of the minerals in the structure and function of the human body." This is an ambitious undertaking, and covers a much more extensive field than one would be led to expect from a reading of the conventional type of journal review. The wide range of subject matter is illustrated by the following random selection of topics: Body water; electroneutrality; osmotic equilibrium; alimentary secretions; urine; ductless glands; muscle contraction; buffer

systems of the blood; Donnan equilibrium; acid- or alkaline-ash values; fasting. The physiological implications of the mineral elements are admirably correlated with the more customary quantitative data.

There are approximately 1,250 citations of the literature, and it is obvious that the author must have consulted many more. The vast majority of the papers cited were published in the last 20 years, and a considerable proportion of these appeared in the last 5.

The book should be especially useful to physicians, physiologists, biochemists, and to those interested in any aspect of the nutrition of man or animals. The type is clear, the format attractive, and there are very few typographical errors. It is the only publication of the kind, and it is exceedingly well done.

The chapter headings are: Introduction; Mineral Composition of the Body; Secretions and Excretions; Internal Secretions; Total Base, Chloride, Ammonium and Bicarbonate; Calcium and Magnesium; Phosphorus; Sulfur; Iron; Iodine; Traces; Water Metabolism; Anion-Cation Relationships; Mineral Intakes, Balances and Requirements; Author Index; Subject Index.

A. G. HOGAN

Industrial Health—Asset or Liability—*By C. O. Sappington, M.D., Dr.P.H. Chicago (160 N. LaSalle St.): Industrial Commentaries,* 1939. 224 pages and 24 examination and survey forms. Price, $3.75.

The balance sheet of industrial health is under scrutiny in this monograph of 224 pages. Directors of industrial relations, industrial physicians, and management will find the treatise useful in evaluating the industrial health program in their establishments and in planning for new and extensive programs to promote preventive and curative industrial medicine. The author lists categorically the objectives of industrial health practice and what can be accomplished by an adequate program of industrial health supervision.

Fifteen chapters, ranging from the evolution and organization of an industrial health service to specific functions of its component parts, and an appendix containing 24 selected model examination and industrial survey forms, make up this volume.

The section on health service for small plants describes how industrial medical supervision may be purchased for these groups, with special reference to the Philadelphia Plan, the details of which are outlined.

" Health Procedures Needing Greater Application in Industry " discusses the advantages derived from the competent preëmployment physical examination program, adequately administered, the importance of the periodic examination, the supervision of the correction of physical defects, and first aid to minor illnesses and accidents.

In the chapter comparing occupational with non-occupational illnesses suggestions are given regarding the control of diseases not directly attributable to industry.

The author undertakes to outline some of the more important conceptions and to offer tentative suggestions for a practical approach to the solution of the problems of fatigue, posture, noise, nutrition, mental hygiene, absenteeism, recreation, ventilation, and illumination. At best the material " merely serves the purpose of guiding the reader."

The chapter on " Administration " is followed by sections which designate the qualifications and duties of the industrial physician and the industrial nurse.

Under the caption " Does Industrial Health Work Pay?" there is a series of examples to prove that it does. The question and answer method is used to prove further the value of industrial health services.

A summary of the material is in-

cluded in the section on general conclusions. Listed also are sources "from which information may be derived regarding industrial health problems and their solutions."

Throughout the author keeps before the reader the values that are recorded on the right hand side of the ledger, and states: "Industrial health work has and will continue to pay dividends upon whatever basis one may choose to calculate them—but the most important of these are human dividends."

Although no bibliography is given the author quotes (with due credit) freely from writings of eminent industrial physicians, industrial hygienists, and others. Specific references and an index would have enhanced the value of the book. BERNARD S. COLEMAN

Protozoology—*By Richard R. Kudo (2nd ed.). Springfield, Ill.: Thomas,* 1939. 676 pp. Price, $6.50.

The first edition of this book appeared in 1931 under the title, "Handbook of Protozoology." The author is Associate Professor of Zoölogy at the University of Illinois. The book has been completely rewritten and increased in length by 225 pages. It is illustrated by 291 etchings showing 2,711 figures of protozoa. It is intended as a textbook, laboratory manual and reference. The first 6 chapters, covering 170 pages, deal with the introduction, ecology, morphology, physiology, reproduction, variation and heredity of protozoa. The remaining 37 chapters are devoted to taxonomy with concise discussion of the biology and development of the various families, genera, and species of the free-living and parasitic protozoa.

Although the book is intended primarily for students of general protozoölogy, it will make a ready reference manual for laboratory workers who may wish to identify protozoa encountered in ecological studies in the field of public health.

The illustrations are of a very high order, many being original and the others taken from authoritative sources. Each chapter is followed by a short list of important and up-to-date references and there is an extensive index. The book is excellent in its entire make up.

HENRY E. MELENEY

Venereal Diseases: Diagnosis, Treatment and Laboratory Methods—*Department of Pensions and National Health, Toronto, Canada,* 1938. 93 pp.

This pamphlet, or manual, of 93 pages, was compiled by the Medical Committee convened by The Health League of Canada. It opens with a chapter on Public Health Aspects, which aims to define the problem quantitatively, on the basis of surveys and hospital records. About 2 per cent of the population is infected with syphilis (about the same as the white population of the United States), and the prevalence of the disease is definitely on the decline. It is less optimistic, statistically, about gonorrhea, but expresses confidence that the free and adequate provision of treatment must eventually have its influence upon the prevalence of that disease also.

There appears to be the same confusion of laws in the several provinces as exists in the states, and their provisions are, on the whole, similar to those in the states.

The descriptions of syphilis and gonorrhea, and of their diagnosis and treatment are good. Physicians in the United States who have learned to accept the treatment schedules advocated by the Coöperative Clinical Group would be upset by the "Continuous Method" of treatment (arsenical and bismuth concurrently for the greater part of the time), and would consider the "Intermittent Method," or "Harrison Method," as rank therapeutic heresy. They would also be at least slightly astonished at the advice that a

little over 7 months of treatment is adequate in the sero-negative primary case, and a little over 13 months, with rest periods toward the end, sufficient for sero-positive primary and secondary cases which have negative blood tests at the end of that time. The dose of bismuth (2.4 gr.) is a little high according to practice in this country. Caution against the over-treatment of the Wassermann-fast infection (spinal fluid negative) meets with our approval. Two grams of Tryparsamide is considered the maximum dose.

A stain for *Treponema pallidum* (Fontana's silver stain) is advocated if darkfield facilities are not at hand, and when no laboratory facilities are available, the indirect capillary method is advocated.

The treatment of gonorrhea in both male and female, according to pre-sulfonamide methods, or for chemotherapeutic failures, cannot be quarrelled with. Since the document was published in 1938, the section on sulfanilamide is not up-to-date and does not consider any of the newer sulfonamides. It is gratifying to note that culture of the gonococcus is considered, throughout, as an essential criterion of cure, and, in chronic infections in the male and most infections in the female, a necessary diagnostic procedure.

Ballinger's Sealed-In Treatment for the abortive treatment of gonorrhea, which "has met with success in thousands of cases," is unfamiliar on this side of the boundary.

The pamphlet will be of use to physicians, laboratory personnel, clinics, hospitals, institutions, and medical students. It will be particularly useful because it has the brevity of a working manual and none of the confusion of an all-inclusive textbook. N. A. NELSON

High Schools and Sex Education —*By Benjamin C. Gruenberg, with the assistance of J. L. Kaukonen. Washington: U. S. Public Health Service*, 1939. 110 pp. Price, $.20.

A revision of a book with the same title published by the U. S. Public Health Service in 1922. It is essentially a manual for high school teachers and administrators with a broad concept of the subject. The suggested modern methods of correlation with the high school curriculum shows an intimate knowledge of the present-day high school.

Qualifications and preparation of teachers has a very prominent place. The qualities essential for a teacher involved in this work are outlined. There are many good suggestions for the preparation of teachers now in service.

The major part is given to "Sex Education in the Subjects of the Curriculum." Here are detailed suggestions for the inclusion of the proper information, attitudes and concepts of the place of sex in the life of a normal adult through Biology, General Science, Physiology and Hygiene, Home Economics, Social Studies and English.

There are reading lists for teachers, administrators, and students. Reliable sources of pamphlets and visual aids are listed. An interesting and unusual section is "Suggested Outline of a Course for Teachers on Sex Education in Secondary Schools." By means of this course an individual or group can make adequate preparation for sex education.

Recognition that the constant social, psychological, emotional, and religious problems of sex are perhaps more troublesome than the purely physical aspect brings the authors to recommend a broad school program rather than an occasional lecture by outside speakers. This book may be used by public health officials who wish to encourage high schools to introduce sex education.

P. K. HOUDEK

Elements of Sanitation—*By Edward S. Hopkins. New York: Van Nostrand,* 1939. 435 pp. Price, $4.00.

Designed as a text for college students, health officers, and public health nurses, this book was prepared with the assistance of 12 specialists in the field of sanitation and hygiene. It is divided into 12 chapters which discuss the scientific background of sanitation, the meaning of determination of pH, water and sewage disinfection, public water supplies, sewage disposal, stream pollution and trade waste disposal, refuse disposal, the essentials of food sanitation, milk sanitation, ventilation and air conditioning, swimming pool control, and environmental hygiene.

In reading a book of this type anyone in the field of public health or sanitation will feel that his particular specialty has been slighted at the expense of other, less important matters. It is believed that there should have been at least some mention of sanitation facilities for camps and institutions at the expense of, say, the comparatively long explanation of pH.

As a text, it would appear desirable to credit the authors with their chapters, provide a more extensive list of references, increase the usefulness of the subject index by providing more items, and eliminate the several errors in spelling and data, and fill omissions.

In the hands of an experienced instructor, the book should be a useful tool in teaching the elements of sanitation.

F. J. MAIER

A Survey of Mouth Hygiene Programs for School Children. *Section V, Cities of 25,000 to 50,000 Population. Cleveland, Ohio: Cleveland Child Health Assn.,* 1939. 201 pp. Price, $.75 per Section.

This is the last Section of the Survey of Mouth Hygiene Programs for school children in American cities, conducted under the Cleveland Child Health Association by Harris R. C. Wilson, D.D.S. It will be remembered that Section I covered 13 cities of over 500,000 population; Section II, 38 cities of 150,000 to 500,000 population; Section III, 42 cities of 100,000 to 150,000 population; and Section IV, 98 cities of 50,000 to 100,000 population.

The Preface by Dr. Wilson expresses regret that the material is almost 2 years old, due largely to the ever changing programs and the practical impossibility of keeping them up to date. He suggests a repetition of the survey after a few years.

Every effort has been made to have the figures as accurate as possible and they may be accepted as such. However, responsibility cannot be assumed for entire accuracy by The Cleveland Child Health Association.

Mouth hygiene is about 40 years old in the United States. The writer of the Preface says "Most of us are groping in the dawn, trying one method and then another in our efforts to discover the way out of a serious dilemma."

All interested in mouth hygiene owe a debt of gratitude to the Cleveland Child Health Association and to Dr. Harris R. C. Wilson, who has carried out this extensive and valuable survey of conditions in the United States.

MAZŸCK P. RAVENEL

Supervision in Public Health Nursing—*By Violet H. Hodgson, R.N. New York: The Commonwealth Fund,* 1939. 376 pp. Price, $2.50.

Here is the book public health nurses have been looking for. We no longer have to depend on texts written for teachers or social workers for our only authority on this subject.

We have here, too, recognition of the fact that there is a great body of supervisors employed in such agencies as county, state, and municipal health departments; in school health departments; in industry; as well as in visit-

ing nurse associations whose technics, procedures, and methods have rightly set the standards for us in the past.

In this day of rapidly rising professional requirements for all types of public health nurses, it is wholesome to have one of the early chapters emphasize the personal qualifications which should form the basis of the good supervisor, who leads by inspiration instead of by authority, and whose leadership is characterized by friendliness, emotional stability, initiative, judgment, and sustained interest.

The current confusion about the duties and interrelationships of generalized supervisors and specialized consultants, and the possibilities and future development or trends in each, furnish some of the most vital information in the book. This also is true of the excellent diagrams showing graphically the three principles of organization and how they function in various types of agencies carrying on public health nursing.

It is difficult to conceive of a more useful or a more timely book than this for all the coördinative and "line" personnel of any agency employing public health nurses. This includes health officers, medical directors of industrial concerns, and school health departments, personnel relations managers and principals and superintendents of schools.

Written by a public health nurse eminently fitted by the variety and type of her experience to be a real authority, this is one of the most significant books on public health nursing in several years.

EVA F. MACDOUGALL

The Child in the Home—*By Leila Wall Hunt. New York: Prentice-Hall,* 1939. 259 pp. Price, $2.50.

This is a book intended, as the preface says, primarily as a text for a general course in child care and development in a college or university. It is written by a nutritionist experienced in teaching students of college age. As is natural, considering the author's background, it stresses nutrition and details of feeding: 8 of the 14 chapters deal wholly or in part with nutritional factors and the appendix is on diets. As a matter of fact this seems like a pretty sound idea. Then there is an excellent chapter on education for parenthood, and a common sense one on habit training for children. A good bibliography follows each chapter.

The section on common pregnancy disorders seems out of line with the rest of the book. The care of the prospective mother is as much a medical responsibility as are children's diseases which are wisely omitted from consideration.

MERRILL E. CHAMPION

Bulletin of the Health Organisation of the League of Nations. Vol. VIII, Nos. 1–2, 1939—*New York: Columbia University Press,* 1939. 386 pp. Price, $1.30.

This issue of the *Bulletin* contains a report of the work of the Health Organisation between June, 1938, and April, 1939, and on the 1939 program. The 3 year plan of the committee runs through 1939 and its results are not yet available. The committee states, however, that its program is being steadily and systematically carried into effect and in accordance with the general ideas on which it is based. The reports are in summary and they do not lend themselves to review.

The issue contains an article on Health Indices, discussing their place in public health reports, and the framework of a skeleton standard report. There is a report on Rural Housing and Planning. By far the larger part of the volume (200 pages of text and 40 pages of reference) is given to Leptospiroses, most of which has special reference to the Netherlands. The whole volume is interesting.

MAZŸCK P. RAVENEL

Educational Psychology, Personality and What Shapes It—*By Daniel Wolford La Rue. New York: Nelson,* 1939. 397 pp. Price, $2.50.

"To serve the practitioner in child culture," is the purpose of *Educational Psychology.* The central problem as formulated by the author in his preface is: "given, a child, how diagnose his personality and make a plan for developing him, achieving his best possible future?"

A few chapters are devoted to the first half of this problem: an analysis of the components of personality and their diagnosis, viz., the propensities, talents, intellectual factors, and bodily organization which make up "X," the child. Succeeding chapters deal with the questions of inherited and acquired traits, maturation, conditioning, motivation and the laws of learning; at which point the author turns his attention to the second half of his problem: the "plan for developing 'X.'" In 5 chapters he discusses the psychology of subject matter, formulating 5 lessons which "X" needs to learn, namely those for Skill, Information, Thought, Sentiment (and Conduct), and Creation. For the teaching of each of these lessons an "efficiency formula" is given which is a rough general plan of attack.

The author then concentrates his attention again on "X," discussing the conditioning of the propensities, the training of talent, the "education" of intelligence, and the conditioning of the body. He concludes with a chapter on the teacher's personality in its relationship to her task, and with a brief discussion of educational measurement.

One wishes that the author resorted a little less frequently to colloquialisms —the lingo of the athletic field is at times a bit annoying in the treatment of a scientific subject. Furthermore, the reviewer finds that the multiplicity of illustrations tends to confuse rather than to illuminate his thought. Perhaps the book is being regarded too much from the standpoint of a clinician who is accustomed to searching out and describing facts unadorned. Perhaps this is why the treatment of psychological tests, educational disability, and mental measurement in general, seems very cursory and incomplete.

The book is to be commended, however, for its analysis of the teacher's job, and for the importance attributed to her own personality in developing the budding personalities in her charge. As a practical guide for the student with little psychological background, it will serve a good purpose, for, in Gesell's words, "the first and almost the last task of the teacher is to understand the child." J. J. CARLSON

Vitamin D — Chemistry, Physiology, Pharmacology, Pathology, Experimental and Clinical Investigations—*By C. I. Reed, Ph.D., H. C. Struck, Ph.D., I. E. Steck, M.D. Chicago: University of Chicago Press,* 1939. 389 pp. Price, $4.50.

Investigators in the science of nutrition can point with pride to their many outstanding achievements during the past decade. Public interest in the subject of vitamins is in itself tacit testimony to the rapid spread of knowledge on substances which only a short time ago were still laboratory curiosities. Of the already large and rapidly expanding family of vitamins, perhaps none has had a more dramatic background or has received more widespread public attention than vitamin D. The prodigious increase in popularity of vitamins has raised a host of questions regarding their use, misuse, and proper therapeutic applications. Nowhere is this more strikingly manifested than in the case of vitamin D.

Accordingly, this timely monograph by Reed and his associates will receive

an enthusiastic reception by investigators in the field of medicine and its allied branches, students of nutrition and biochemistry, teachers and public health workers alike. Its 389 pages of text, liberally interspersed with illustrations and tables and with a bibliography of 912 references arranged alphabetically according to authors, offers a provocative and stimulating treatise on recent experimental and clinical researches on vitamin D.

According to the authors, "We have not made any pretense of a complete review of the literature, but rather have devoted the work mainly to discussion and tentative interpretation of the more recent literature and integration with the results of the investigations which have occupied our attention since early in 1929." The book was not intended as a text, for the matter-of-fact style of prosaic textbooks is notably absent, nor does it pretend to offer a final solution to any of the many perplexing problems associated with the mode of action or metabolic effects of vitamin D. Rather it presents an intriguing progress report of the more recent developments in this rapidly changing field. In attaining its professed aims, this book has been admirably successful.

Several chapters discuss the chemistry and physiology of vitamin D and related compounds, its relation to rickets, and the various methods of its determination. These discussions center around the characteristic responses associated with the use of physiological amounts of vitamin D. The chapters following consider the use of vitamin D in pharmacological amounts and its less well understood effect on blood constituents, on the parathyroids, on resistance to infection, on mineral metabolism. The special sections dealing with the use of massive doses of vitamin D in the treatment of arthritis and in other therapeutic applications will be particularly stimulating to clinicians and to students of experimental medicine. The fact that case histories of nearly 1,000 human subjects were studied, to whom large doses of vitamin D had been given over a period of years with no fatalities, nor any evidence of chronic injury when toxicity was not observed, offers convincing proof of the relative harmlessness of vitamin D when used in recommended dosages. The threshold of intoxication for human subjects appears to be about 20,000 units per kilogram of body weight.

This authoritative, well written book, by men renowned for their original researches in this field, is a welcome and invaluable contribution to a subject which is destined to hold the spotlight of public attention and scientific inquiry for many years. JAMES T. LOWE

Pathogenic Microörganisms — A Practical Manual for Students, Physicians and Health Officers— *By William H. Park, M.D., and Anna W. Williams, M.D. (11th ed. rev.). Philadelphia: Lea & Febiger,* 1939. 1056 pp. Price, $8.00.

The 11th edition of this excellent book upholds the high standard of its predecessors. It continues to be one of the best for use by students of medicine and public health. As in previous editions the historical background of the discovery and development of our knowledge of the various organisms is sketched. The book continues to stress epidemiological data and laboratory methods of diagnosis of the various diseases helpful not only to the medical student but also to those especially interested in preventive medicine and public health. This new edition has been kept thoroughly up to date.

The filterable viruses in general are adequately treated although certain diseases due to them are given rather scanty attention in comparison to their importance and our knowledge of them. The chapter on influenza gives a com-

prehensive summary of our present knowledge on this subject.

Additional matter on the Rickettsia diseases might well have been included, as only 6 pages are given.

It is stated that Rocky Mountain spotted fever is restricted chiefly to the northwestern part of the United States. Recent data show this no longer holds true, for during the years 1933–1937, 27.4 per cent of all the cases reported in the United States occurred in the South Atlantic States. *Dermacentor andersoni* is the only tick given as transmitting this disease, no mention being made of the importance of *Dermacentor variabilis* as a vector on the Eastern Seaboard.

The chapters on malaria as well as those on the intestinal protozoa are concise and well illustrated.

A few misprints were noted, such as "North Border" for "North Brother" Island. Maurer's is misspelled Maurrer's.

The book maintains its high standard of make-up, is well printed, and admirably illustrated.

HAROLD W. BROWN

The Phosphatase Test for Control of Efficiency of Pasteurization —*By H. D. Kay, R. Aschaffenburg, and F. K. Neave. Shinfield (near Reading), England: Imperial Bureau of Dairy Science,* 1939. 54 pp. Price, $.75.

The article is a critical review of the phosphatase test, covering completely its development, modifications, and application to milk and various milk products. It summarizes the results obtained by various investigators, pointing out the advantages and limitations of the test, the sensitivity, and effect of various factors such as storage, preservatives, bacterial contamination, stage of lactation, and mastitis on its reliability.

The conclusions are that the test for milk is very sensitive, accurate, and effective in controlling the efficiency of pasteurization by the "holder" process. The test in its appropriate modification is sufficiently sensitive to detect a drop in temperature of 1.0 to 1.5° F. if pasteurizing temperature is 143° F. for 30 minutes. If 145° F. for 30 minutes, a drop of 1.5° F. can be detected.

A reduction of 10 minutes in holding time can be detected, but not 5 minutes with certainty.

The presence of 0.2 to 0.25 per cent of raw milk in pasteurized product can be detected and in many instances even smaller amounts.

Regarding the application of the test to the high temperature short time holding process it is concluded that, "the claim that the phosphatase test remains sensitive under H.T.S.T. conditions is well founded, but further experimental evidence is required to settle a number of details." Also, that the accuracy of the test when applied to products other than milk is still disputed, and further investigation is required with reference to amount of sample to be used for testing, limiting color standards, etc.

It is confidently expected that further research will achieve tests for milk products which will be as accurate and reliable for controlling the pasteurizing process as that already achieved for milk.

An appendix gives precautions and detailed instructions for performing the prosphatase test. Technic for the following, and modifications are given:

A. Kay-Graham Test A and Test B
B. Neave's Modification
C. Gilcreas and Davis Modification
D. Scharer's Modification
   1. Laboratory Test
   2. Field Test
E. Leahy's Modification
F. Aschaffenburg and Neave's Modification

L. H. BURGWALD

Maternal Care and Some Complications—*Edited by F. L. Adair, M.D. Chicago: University of Chicago Press,* 1939. 194 pp. Price, $1.50.

This helpful handbook in essence is a combination of the material published in two former manuals under the titles *Maternal Care* and *Maternal Care Complications.* It makes available in concise form the fundamental principles of prenatal, intrapartum, and postpartum care. Particular stress is laid upon prevention of complications. It is evident that if the directions given in this little volume are carefully carried out, there would follow not only a reduction in maternal mortality and morbidity but a considerable lessening of the number of stillbirths and neonatal deaths. This manual can be highly recommended to physicians, nurses and others having anything to do with the puerperal woman.

RICHARD A. BOLT

BOOKS RECEIVED

A DOCTOR'S HOLIDAY IN IRAN. By Rosalie Slaughter Morton. New York: Funk & Wagnalls, 1940. 335 pp. Price, $3.00.

MIND EXPLORERS. By John K. Winkler and Walter Bromberg. New York: Reynal & Hitchcock, 1939. 378 pp. Price, $3.00.

NURSING AS A PROFESSION. By Esther Lucile Brown. 2d ed. New York: Russell Sage, 1940. 157 pp. Price, $.75.

PRACTICAL FOOD INSPECTION. By C. R. A. Martin. Vol. I. MEAT INSPECTION. 2d ed. 316 pp. Price, $3.75. Vol. II. FISH, POULTRY AND OTHER FOODS. 2d ed. 284 pp. Price, $3.00. London: Lewis, 1940.

CONGENITAL MALFORMATIONS. By Douglas P. Murphy. Philadelphia: University of Pennsylvania, 1940. 98 pp. Price, $2.00.

YOUR CHILD'S DEVELOPMENT AND GUIDANCE TOLD IN PICTURES. By Lois Hayden Meek. Philadelphia: Lippincott, 1940. 166 pp. Price, $2.00.

HOSPITAL BOOK GUIDE. Vol. 1, No. 1. Chicago: American Library Association, 1940. 18 pp. Published quarterly. Subscription $1. per year. Single copies, 35¢.

ALL THE WORLD TO SEE! Twenty-fifth Annual Report of the National Society for the Prevention of Blindness, Inc. New York, N. Y. 1939. 12 pp.

THE SCIENCE OF PSYCHOLOGY. By Raymond H. Wheeler. 2d ed. New York: Crowell, 1940. 436 pp. Price, $2.75.

MANUAL OF INDUSTRIAL HEALTH HAZARDS. By Joseph B. Ficklen. West Hartford: Service to Industry, 1940. 176 pp. Price, $4.00.

A CHECK LIST FOR THE SURVEY OF HEALTH AND PHYSICAL EDUCATION PROGRAMS IN SECONDARY SCHOOLS. By Terry H. Dearborn. Stanford University Press, Calif., 1940. 23 pp. Price, $.60.

HOUSEHOLD HYGIENE. By J. C. Geiger. San Francisco: Department of Health, 1940. 96 pp.

LET'S TALK ABOUT YOUR BABY. By H. Kent Tenney. 2d ed. rev. Minneapolis: University of Minnesota Press, 1940. 115 pp. Price, $1.00.

DIABETES: PRACTICAL SUGGESTIONS FOR DOCTOR AND PATIENT. By Edward L. Bortz. 2d ed. rev. Philadelphia: Davis, 1940. 296 pp. Price, $2.50.

A SELECTED PUBLIC HEALTH BIBLIOGRAPHY WITH ANNOTATIONS

RAYMOND S. PATTERSON, PH.D.

Case Finding by Roentgenogram—Primary tuberculosis infection in adults usually gives rise to no symptoms, then it proceeds to a spontaneous healing which cannot be hastened by any treatment or retarded by unhygienic conditions. Such a happy outcome may not be anticipated for the secondary lesion: this is the one that must be found early and treated adequately. Detecting the early secondary lesion is not easy. Case finding becomes more complex.

BRAHDY, L. Tuberculosis Case Finding. Indust. Med. 9, 3:139 (Mar.), 1940.

Who Was Sick and with What—In a nation-wide sickness canvass, 4½ per cent of the people were laid up on the day of the canvass, 18 per cent had a chronic condition or impairment. Respiratory diseases were most common, but cardiovascular diseases caused more disability. Half the chronic cases were under 45. There is a great deal more here, which all should know.

BRITTEN, R. H., *et al.* The National Health Survey. Pub. Health Rep. 55, 11:444 (Mar. 15), 1940.

An Important Last Step—Many health workers in addition to those engaged in tuberculosis control will welcome this detailed statement of methods by which suitable tuberculous patients may be given the advantage of rehabilitation.

COPP, T. Federal and State Programs of Vocational Rehabilitation. Am. Rev. Tuberc. 41, 2:246 (Feb.), 1940.

Less Than 10,000 Maternal Deaths—Better maternal care is being rewarded by a marked improvement in the maternal death rates. But they are still far too high. Birth rates were up and maternal mortality down in 1938.

DAILY, E. F. Maternal Mortality, 1938. J.A.M.A. 114, 11:960 (Mar. 16), 1940.

Wastage in Child Life—Nearly a quarter of a million American children die annually. Thirty-seven different conditions, causing more than half of these deaths can be prevented if the public will utilize treatment facilities already, or being, provided—especially for prenatal and natal care.

DAVISON, W. C. Preventive Pediatrics. J.A.M.A. 114, 9:742 (Mar. 2), 1940.

"Ask-me-another" — The "Quiz-program" technic plus supplying the correct answers is suggested as an inexpensive, practical health educational device. It worked at the fair.

DERRYBERRY, M., and WEISSMAN, A. Using Tests as a Medium for Health Education. Pub. Health Rep. 55, 12:485 (Mar. 22), 1940.

Background for Health—Health is often treated as an extra-curricular activity, a little more refined than football, but not so interesting. Health education requires more than facts of life for it depends upon medical understanding. It is not a matter of loose thinking, or opinion; it is a matter of knowledge. These gems are a few of the many in this abstract of an address.

HAGGARD, H. W. Educational and Personal Health. J. School Health. 10, 3:80 (Mar.), 1940.

Interns and Tb.—Tuberculous infiltration of the lungs, in most instances asymptomatic, was found in 18 per cent of the examined medical students in

one school of medicine. But physicians do not have clinical tuberculosis in greater proportion than laymen, and their mortality is relatively low. It would seem that physicians are willing to practise what they preach.

HETHERINGTON, H. W., and ISRAEL, H. L. Tuberculosis in Medical Students and Young Physicians. Am. J. Hyg. 31, 2:45 (Mar.), 1940.

School Children and Tb.—Reporting upon the 10 year tuberculosis case finding program in Massachusetts, the principal conclusion is that no differences existed in the incidences in boys and girls. Reaction rates are not indicative of relative susceptibility, and the usual upward trend in reaction percentages in the higher school ages was found.

HUTCHINSON, E. P., and POPE, A. S. Tuberculosis among Massachusetts School Children. Am. J. Hyg. 31, 2:62 (Mar.), 1940.

Air-Borne Germs—Studies of the air in operating rooms suggest that the bacterial content varies with the number of the people in the room and their activities. The infection of clean wounds from this source cannot be ignored.

MACDONALD, K. A Quantitative Bacterial Analysis of the Air of Operating and Delivery Rooms and Related Areas of a General Hospital. Am. J. Hyg. 31, 2:74 (Mar.), 1940.

Recording Who Gets What Care—For small health departments an individual index card is recommended. Its many uses are pointed out.

MOUNTIN, J. W., and FLOOK, E. The Place of the Index in Health Department Record Keeping. Pub. Health Rep. 55, 10:387 (Mar. 8), 1940.

Making the Most of Educational Opportunities—We train women to be nurses, then appoint them public health nurses and expect them to be teachers! The adequacy of teaching in the field is discussed in illuminating detail; and some suggestions are given about ways to improve the whole educational program.

MOUNTIN, J. W. Our Verbal Public Health Activities. Pub. Health Rep. 55, 8:323 (Feb. 23), 1940.

Pills vs. Protective Foods—It is to be regretted that, appearing as it does in a British health publication, so few expectant authors who are preparing to bear down on the audiences of the Detroit Annual Meeting will have an opportunity to see this perfectly swell example of how to prepare a sprightly public health paper.

POND, H. The Nutrition of the Expectant Mother from the Point of View of the Administrator. J. Roy. Inst. Pub. Health & Hyg. 3, 3:75 (Mar.), 1940.

Discovering Health Motives—Words of profound advice offered to the teacher of health in the classroom apply equally to the problem of the health educator of the public—as who of us isn't?

ROGERS, J. F. Incentives and Methods in Health Education. J. School Health. 10, 3:65 (Mar.), 1940.

Cancer Can Be Cured—Ontario has seven well equipped diagnostic and treatment centers for cancer, which are being widely used by patients referred by one of every four physicians in the province. Not much evidence is found to indicate earlier diagnosis through this service.

SELLERS, A. H. The Contribution of the Ontario Cancer Clinics to the Control of Cancer. Canad. Pub. Health J. 31, 2:72 (Feb.), 1940.

What the Public Should Know about Measles—A "measles issue" of Neighborhood Health presents some excellent papers for popular consumption.

SMITH, C. H. Measles—Its Prevention and Its Treatment (and five related papers). Neighborhood Health (New York City Dept. of Health). 6, 2:1 (Mar.), 1940.

Bundle of Reeds Makes Firm Staff—Team work is urged for health education to earn public support and the patient's coöperation in the tuberculosis control program. With a minimum of adaptation the same formula can be applied to every other public health administrative project.

VAUGHAN, H. F. Tuberculosis Control. Am. Rev. Tuberc. 41, 2:232 (Feb.), 1940.

When Eskimos Eat Lollipops—In the Eskimo, at any rate, the eating of refined sugar initiates and causes an increase in the growth of oral lactobacilli and also increases the incidence of dental caries. "Natural" sweets—raisins, prunes, honey—were found blameless.

WAUGH, B. B., and WAUGH, L. M. Effects of Natural and Refined Sugars on Oral Lactobacilli and Caries among Primitive Eskimos. Am. J. Dis. Child. 59, 3:483 (Mar.), 1940.

Year — 1939: Blood Tests — 6,200,000—Progress report on the control of syphilis and gonorrhea since the advent of Dr. Parran's famous article in the July, 1936, Survey Graphic.

VONDERLEHR, R. A. Are We Checking the Great Plague? Survey Graphic. 39, 4:217 (Apr.), 1940.

Where Ignorance Isn't Blissful—Most of the many, many things that people don't know about tuberculosis, and many that they know but aren't so, are paraded for us that we may have a little better idea what to do about the deficiencies of human understanding. A stimulating paper.

WHIPPLE, K. Z. W. Tuberculosis Control. Am. Rev. Tuberc. 41, 2:237 (Feb.), 1940.

ASSOCIATION NEWS

SIXTY-NINTH ANNUAL MEETING
DETROIT, MICH., OCTOBER 8–11, 1940
HEADQUARTERS
Book-Cadillac Hotel and Hotel Statler

APPLICANTS FOR MEMBERSHIP

The following individuals have applied for membership in the Association. They have requested affiliation with the sections indicated.

Health Officers Section

Herbert N. Barnett, M.D., Benton, La., Director, Parish Health Unit

Lamar A. Byers, M.D., Sevier County Health Dept., Sevierville, Tenn., Director

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Francis D. Ellis, M.D., Farmington, Conn., Health Officer

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Julius A. Hene, M.D., 311 W. 19th St., New York, N. Y., Student, DeLamar Institute of Public Health

DECEASED MEMBERS

I. W. Knight, M.D., Dr.P.H., Pitman, N. J., Elected Member 1916

James Roberts, M.D., Hamilton, Ontario, Can., Elected Member 1907, Elected Fellow 1922

A. C. Stokes, M.D., Omaha, Nebr., Elected Member 1928

Robert H. Trimble, M.D., London, Ohio, Elected Member 1938

CLOSING DATE FOR SUBMITTING FELLOWSHIP APPLICATIONS

MEMBERS who may be interested in applying for Fellowship in the A.P.H.A. are hereby advised that August 1 is the latest date on which Fellowship applications can be accepted for 1940 election.

HEALTH CONSERVATION CONTESTS

WINNERS IN THE ELEVENTH ANNUAL CITY HEALTH CONSERVATION CONTEST

GROUP I (cities over 500,000 population)—Milwaukee, Wis., wins the first award. An award of merit in this population group goes to Baltimore, Md.

GROUP II (cities of 250,000 to 500,000 population)—Memphis, Tenn., is the winner. Awards of merit in this group go to Louisville, Ky., Newark, N. J., Dallas, Tex., and Toledo, Ohio.

GROUP III (cities of 100,000 to 250,000 population)—First awards were given to both New Haven and Hartford, Conn. Awards of merit go to Grand Rapids, Mich., Yonkers, N. Y., Reading, Pa., Springfield, Mass., and Erie, Pa.

GROUP IV (cities of 50,000 to 100,000 population)—The winner is Newton, Mass. Awards of merit go to Evanston, Ill., Schenectady, N. Y., Pasadena, Calif., Madison, Wis., East Orange, N. J., Racine, Wis., and Sacramento, Calif.

GROUP V (cities of from 20,000 to 50,000 population)—First awards were given to both Greenwich, Conn., and Plainfield, N. J. Awards of merit go to Hackensack, N. J., Winona, Minn., Brookline, Mass., Stamford, Conn., and Orange, N. J.

GROUP VI (cities of less than 20,000 population)—The winner is Englewood, N. J. Awards of merit go to Asbury Park, N. J., Hibbing, Minn., and Virginia, Minn.

WINNERS IN THE SIXTH ANNUAL RURAL HEALTH CONSERVATION CONTEST

NORTHEASTERN DIVISION—The winner is Alger-Schoolcraft Health Unit, Mich. Awards of merit go to District 7, Gladwin, Mich., Chippewa County, Mich., District 2, West Branch, Mich., Mecosta-Osceola Health Unit, Mich., Wayne County, Ohio, Saginaw County, Mich., Barnstable County, Mass., Lorain County, Ohio, Berkshire District, Mass.

EASTERN DIVISION—The winner is Fayette County, Ky., and awards of merit go to Montgomery County, Md., Jefferson County, Ky., Scott County, Ky., Arlington County, Va., Mason County, Ky., Prince George County, Md., Anderson County, Ky., and Madison County, Ky.

SOUTHEASTERN DIVISION—The winner is Lauderdale County, Miss., and awards of merit go to Coahoma County, Miss., Charleston County, S. C., Spalding County, Ga., and Adams County, Miss.

NORTH CENTRAL DIVISION—Awards of merit go to Union County, S. Dak., Des Moines County, Ia., Gallatin County, Mont., and Cascade County, Mont.

SOUTH CENTRAL DIVISION—The winner is St. Mary's Parish, La. Awards of merit go to Dallas County, Tex., and Tyler-Smith Health Unit, Tex.

WESTERN DIVISION—The winner is Wasco County, Ore. Awards of merit go to Kern County, Calif., Thurston County, Wash., Jackson County, Ore., Marion County, Ore., and Clallam County, Wash.

SPECIAL AWARDS for having won the Rural Contest twice in their respective geographic districts and for having maintained their previous high standards of achievement during 1939 go to Davidson County, Tenn., El Paso County, Tex., Pike County, Miss., Shawnee County, Kans., and Woodbury County, Ia.

CANADIAN RURAL HEALTH CONTEST—The winner is St. James-St. Vital Health Unit, Manitoba. Awards of merit go to Terrebonne Health Unit, Quebec; Foothills Health Unit, Alberta; Nicolet County Health Unit, Quebec; and Laviolette Health Unit, Quebec.

A SPECIAL AWARD for having won the Canadian Contest twice and for having maintained its previous high standard during 1939 goes to St. Jean-Iberville-Laprairie-Napierville County Health Unit, Quebec.

These contests are conducted annually by the Chamber of Commerce of the United States with the coöperation of the American Public Health Association. The Rural Health Conservation Contest is financed by the W. K. Kellogg Foundation and the City Health Conservation Contest by a group of insurance companies.

EMPLOYMENT SERVICE

The Association Employment Service seeks to bring to the attention of appointing officers the names of qualified public health personnel and to act as a clearinghouse on employment. This is a service of the Association conducted without expense to employer or employee.

From the registry of persons available, selected announcements are published from time to time. Appointing officers may obtain lists of all registrants on request.

The Association welcomes inquiries with regard to persons qualified, especially in the following classifications:

Administrative health officers
Epidemiologists
Public health educators
Maternal and child health physicians
Industrial hygienists
Laboratory directors

Positions Wanted

ADMINISTRATIVE

A position in epidemiology or administrative public health is desired by physician with C.P.H. from Johns Hopkins, 11 years' administrative public health experience, and excellent background of communicable disease control and school health service. **A368**

Administrative public health or epidemiological position is desired by well qualified physician, with M.P.H. degree, 16 years' experience as county and city health officer, and 3 years epidemiologist. **A206**

Physician, with M.S.P.H., now completing course for Doctor of Public Health degree, who has had 6 years' experience as public health administrator, seeks administrative position in full-time city or city-county health department. Available July 1. **A367**

Position in administrative public health, maternity, infancy and child health, or health education desired by physician with C.P.H. from Johns Hopkins, who has had experience in these fields. **A343**

Physician, M.P.H., Harvard; well experienced in city and rural health administration, will consider appointment as district health officer or in city or state health department. **A418**

Physician, M.D., C.P.H., experienced as district health officer, prefers to do venereal disease control work or epidemiology. **A345**

HEALTH EDUCATION

Well qualified woman in health education wishes position as health coördinator or health counselor. Has wide experience, and Ph.D. from New York University. **H236**

Position as health coördinator desired by young woman experienced teacher in health education, with M.S.P.H. from the University of Michigan. **H398**

Experienced teacher in public health and author; M.A., Columbia; experienced in teaching public health nursing and carrying field promotion, wishes broad opportunity to train field personnel in extending knowledge and interest to the general public, especially through group education, institutes, exhibits, and rural programs. **H400**

LABORATORY

Teaching, executive or administrative position desired by experienced teacher in bacteriology and public health; Ph.D., Cornell; now professor in grade A medical school. **L327**

Broadly experienced laboratory director, with excellent background, now employed, seeks responsible position in laboratory work or teaching of bacteriology, immunology or pathology. **L426**

Bacteriologist, serologist, B.S., M.A. degrees, 2 years' experience foods, dairy and biochemistry in public health laboratory, desires position in research or routine. **L454**

Bacteriologist, serologist, with 8 years' public health laboratory experience, desires position. **L455**

Young man bacteriologist, M.S., Cornell; Ph.D., Rutgers; experienced in bacteriology, water supply, sewage, dairy and general public health laboratory work, extensive research in bacteriology

and sanitary chemistry; seeks responsible position in laboratory work or teaching of bacteriology, dairy industry or sanitary chemistry. **L439**

ENGINEERING

Engineer, aged 28, 3 years' experience as district sanitation supervisor, state department of health, together with work on plumbing, heating and ventilation, will consider position in the plumbing and heating field or state department of health. Prefers middle western or western states. **E453**

Engineer with good training and experience in water treatment, sewage plant operation and in research, wishes position as superintendent. Can go anywhere. **E422**

STATISTICS

Young Ph.D. (Austrian), single, available for any type of statistical and research work. Highly trained and experienced in applied mathematics, technics of statistical analysis, pictorial statistics, visual education. Also qualified to plan and participate in training of physically disabled. Excellent references both here and abroad. **S456**

Opportunities Available

DIRECTOR—Well-established visiting nurse association; staff of 16 nurses, 2 supervisors; executive ability and experience public health supervising important; eastern industrial city; $2,800. PH-50, Medical Bureau, Palmolive Building, Chicago.

NURSING SUPERVISOR—Graduate nurse with public health supervising experience to supervise heavy bedside nursing program under guidance executive director; duties begin in September; city of 50,000. PH-51, Medical Bureau, Palmolive Building, Chicago.

PUBLIC HEALTH NURSE—For staff appointment, county health unit; $125 monthly plus $40 automobile allowance; immediately available; midwest. PH-52, Medical Bureau, Palmolive Building, Chicago.

PUBLIC HEALTH SUPERVISOR — Graduate nurse with college degree, degree in public health nursing, and supervising experience in standard public health agency; $160, increasing to $175, plus car allowance; large southern metropolis. PH-53, Medical Bureau, Palmolive Building, Chicago.

COUNTY HEALTH PHYSICIAN—Young physician interested in rural health problems; southerner under 35 with some public health training preferred; training available to young man interested but lacking special work public health; about $225. PH-54, Medical Bureau, Palmolive Building, Chicago.

CITY HEALTH PHYSICIAN — Young man qualified to carry on established health program; staff of 14, annual stipend vicinity $5,000, plus car and car expenses; western town of 25,000. PH-55, Medical Bureau, Palmolive Building, Chicago.

STUDENT HEALTH PHYSICIAN—Four year appointment, combining duties on university health service with training in public health or other specialty; should lead to M.S. degree by end of fourth year; $2,000 increasing by degrees to $3,400; midwest. PH-56, Medical Bureau, Palmolive Building, Chicago.

DIRECTOR—For county health department to be organized in thickly populated section of South, southerner with degree in public health administration and some practical experience in public health problems preferred; initial stipend $4,000—to be increased substantially when department is well organized. PH-56, Medical Bureau, Palmolive Building, Chicago.

Situations Wanted

PUBLIC HEALTH NURSE—B.S. and graduate nurse degrees, state university; year's graduate training in public health nursing; several years' teaching experience; 2 years, supervisor, clinics, university hospital; for further information please write Burneice Larson, Director, Medical Bureau, Palmolive Building, Chicago.

YOUNG LAYMAN—Now completing graduate training in public health, preventive medicine, and bacteriology, is available for public health appointment or one involving public relations; B.S. degree, state university; 8 years' experience as public relations counsel; for further information please write Burneice Larson, Director, Medical Bureau, Palmolive Building, Chicago.

BACTERIOLOGIST—A.B., Ph.D., state university; 6 years, university laboratory for animal pathology; 4 years, parasitologist, state department of public health; for further information please write M. Burneice Larson, Director, Medical Bureau, Palmolive Building, Chicago.

YOUNG PHYSICIAN—Is available for public health appointment; A.B., M.D., eastern schools; M.S.P.H., Michigan; interesting record of successful experience; for further information please write Burneice Larson, Director, Medical Bureau, Palmolive Building, Chicago.

YOUNG PHYSICIAN—Is interested appointment with maternal welfare organization; 4 years' postgraduate work and residencies in obstetrics and gynecology, university medical center; will take American Board examinations upon completion of service in July; for further information please write Burneice Larson, Director, Medical Bureau, Palmolive Building, Chicago.

NEWS FROM THE FIELD

SUMMER SCHOOL COURSES IN PUBLIC HEALTH

While the following list does not show all universities and technical schools offering summer courses in public health, it represents those who have replied to a questionnaire sent out by the American Public Health Association.

American National Red Cross

Courses in Teacher Training for Home Hygiene Instruction:

University of California, Los Angeles, Calif.—July 1–August 9
Colorado State College, Fort Collins, Colo.—July 6–August 16
Peabody College, Nashville, Tenn.—June 10–August 23

University of California, Berkeley, Calif.

July 1–20

Institute on Maternal and Infant Hygiene (for registered nurses):
- Public Health Aspects
- Medical Problems
- Group Discussions

July 1–August 9

General Bacteriology
Child Development
Physiology of the Growth and Development in the Child
Administration of the School Health Program
Health Problems in the Secondary Schools
Child Psychology
Public Health Aspects of Maternal and Infant Hygiene—3 weeks' institute, July 1–July 20—under auspices of University of California and the State Department of Public Health
Introduction to Educational Psychology
General Psychology
Elementary Epidemiology *
Elementary Public Health *

* These two courses are offered in the Intersession, May 20–June 28.

University of California at Los Angeles, Los Angeles, Calif.

July 1–August 9

Elementary Bacteriology
Growth and Development of the Child
Adolescence
Administration of the School Health Program
Social Backgrounds of Child Development
Recreational Leadership
Principles of Teaching as Applied to Home Hygiene Courses
Methods in Teaching Home Hygiene Courses with Practice Teaching
Essentials of Nutrition
Family Relationships
General Psychology
Child Psychology
Educational Psychology
Public Health and Preventive Medicine
Principles and Practice of Public Health Nursing
Social Case Work as Related to Public Health Nursing
General Human Physiology
General Zoölogy
Social Institutions
The Family
Care of Dependents

The Catholic University of America, Washington, D. C.

June 28–August 10

Child Study
Nursing Education
Public Health Nursing
Social Work
Sociology

Colorado State College of Education, Greeley, Colo.

June 17–August 10

(One 4-week session, one 6-week session)

Nursing Education:
- Fundamentals of Community Nursing
- The Curriculum and Principles of Teaching Applied to Nursing Education
- Ward Management and Ward Teaching
- Trends in Nursing Education
- Trends in Guidance
- School Health Education
- State Supervision of Nursing Education
- Administration in Schools of Nursing

Teachers College, Columbia University, New York, N. Y.

July 8–August 16

- Administration of Health Education in Public Schools; Principles and Special Problems in Health Education; Methods and Materials of Health Instruction in Schools and Colleges
- Health Education
- Health and Physical Education
- Recreation
- Health Care of Children
- Nutrition and Health
- Personal and General Hygiene
- Public Health Nursing
- Public Health Administration
- School Hygiene
- School Nursing

Education of the Handicapped:
- Demonstration Classes
- Observation, Practice Teaching, and Special Clinical Work
- Survey of Ear, Orthopedic, Cardiac, and Certain Tuberculous Conditions, and of Certain Types of Malnutrition
- Education of the Blind and Partially Sighted (beginning and advanced courses)
- Education of the Deaf (advanced courses only), and of the Hard of Hearing (beginning and advanced courses)
- Education of the Motor Handicapped
- Education of the Mentally Handicapped
- Education of the Socially Handicapped
- Speech Correction for the Handicapped
- Psychology of Physically Handicapped Children
- Music and Rhythms for the Handicapped

Cornell University, Ithaca, N. Y.

July 8–August 16

Health Education:
- The School Health Program
- Mental and Physical Health Problems of the School Child
- Mental Hygiene

University of Denver, Denver, Colo.

June 17–August 23

- Conference on Health and Physical Education, June 24, 25, 26

Duke University, Durham, N. C.

June 12–July 23

- Materials and Methods in Health Education
- Mental Hygiene of the School Child
- Personal and School Hygiene

Harvard University—Medical School, Boston, Mass.

June 18–August 2

- Physiotherapy (course for graduates)

The University of Hawaii, Honolulu, Hawaii

June 24–August 2

Public Health Nursing:
- Supervision in Nursing
- The Teaching of Health

Physical and Health Education
- Principles of Public School Health

University of Illinois, Urbana, Ill.

June 17–August 10

Bacteriology:
- Introductory Bacteriology and Sanitary Science
- Epidemiology

Entomology:
- Destructive and Useful Insects
- Control of Insect Pests

Home Economics:
- Nutrition
- Dietetics
- Foods
- Organization and Management of the Home
- The Child and His Development

Physical Education for Men:
- Physical Education
- Problems in Physical Education
- Problems in School Health

Safety Education
Training and First Aid
Physical Education for Women:
Physical Education
Physical Education Program for the High School
Playground Activities for Elementary Schools
Health Education in the High School
First Aid
Community Recreation
Social Administration:
Recent Developments in Public Welfare Administration
Social Case Work
Child Welfare
Social Case Work with Children

State University of Iowa, Iowa City, Iowa

June 4–August 22

Physical Education for Women
Physical Education for Men
School Health Problems
Therapeutic Exercise
Physiology of Exercise
History and Principles of Physical Education
Tests and Measurements in Physical Education
First Aid to the Injured
Club and Camp Leadership
Play and Recreational Leadership
Administration of Physical Education

University of Kentucky, Lexington, Ky.

June 17–August 16

School for Public Health Workers (Health Officers, Sanitarians, Nurses):
Biostatistics
Health Administration
Epidemiology
Maternal and Child Health
Chemistry of the Vitamins
Mental Hygiene
Government and Public Health
Public Health Bacteriology
Sanitary Engineering
Public Health Nursing
General Psychology
County Health Practice
Field of Social Work

Loyola University (School of Medicine), Chicago, Ill.

June 24–August 3

Methods and Materials in Health Education
Principles of Public Health Nursing
Public Health Statistics
Principles of Social Case Work
School Health Problems
Applied Public Health Nutrition
Public Health Nursing in Special Fields
Principles of Sociology
Educational Psychology
Organization and Administration in Public Health Nursing
Physiologic Hygiene
Community Hygiene and Epidemiology
Social and Public Health Aspects of Mental Hygiene
Public Health Law
Advanced Vital Statistics
Child Welfare

Massachusetts Institute of Technology, Cambridge, Mass.

Bacteriology (June 10–June 28)
Public Health Bacteriological Methods (July 1–July 19)
Food Technology (July 1–July 19)
Four Year Summer Program leading to C.P.H.
First Summer—July 1–August 21, 1940
Communicable Diseases
Principles of Sanitation
Public Health Administration
Vital Statistics

Michigan State College, East Lansing, Mich.

June 17–July 26

General Bacteriology
Medical Biology Courses
Pathological Bacteriology
Personal Hygiene
Industrial Hygiene
Physical Education Departments offer the following courses:
School Health Problems
First Aid

Mills College, Oakland, Calif.

June 11–August 3

Child Development
Dance in Education
Workshop in "Neuro-Psychiatry for Educators"
Intensive Program for Group-Work and Recreation Leaders

University of Minnesota, Minneapolis, Minn.

First Term, June 17–July 26

Second Term, July 29–August 30

First Term:
Tuberculosis and Its Control
Mental Hygiene
Principles of Public Health Nursing
Field Practice with Family Health Agency
Supervision in Public Health Nursing
Advanced Problems in Public Health Nursing
Biometric Principles
Biostatistics Laboratory
Topics in Biostatistics

Second Term:
Special Methods and Supervised Practice in Health Teaching
Elements of Preventive Medicine and Public Health
Maternal and Child Hygiene
Field Work with Family Health Agency
Environmental Sanitation—General
Public Health Administration

National Society for the Prevention of Blindness, 50 West 50th Street, New York, N. Y. (in coöperation with the following colleges and universities)

Courses for the Training of Teachers and Supervisors of Sight-Saving Classes:
Oregon State System of Higher Education, Portland, Ore.
Elementary Course, June 17–July 26
State Teachers College, Buffalo, N. Y.
Elementary Course, July 1–August 9
University of Minnesota, Minneapolis, Minn.
Advanced Course, June 17–July 26
Wayne University, Detroit, Mich.
Elementary Course, June 24–August 2, or July 1–August 9

New Jersey State Teachers College, Montclair, N. J.

July 1–August 10

Administration
Biology
General Science
Guidance
Personnel Problems
Philosophy of Education
Physical Education, Coaching
Psychology and Mental Hygiene
Research and Techniques
Sociology
Techniques of Education
Tests and Measurements

University of New Mexico, Albuquerque, N. M.

June–August

Social Hygiene
Community Health
Educational Hygiene

New York School of Social Work, New York, N. Y.

June 18–August 30

Social Work Courses
Community Health Problems
Field Work

New York University, New York, N. Y.

Intersession: June 4–28

Summer Sessions: July 2–19 and July 22–August 9 at Washington Square; July 2–August 9 at Lake Sebago

Nursing Education: (at Washington Square)
Principles and Methods of Teaching in Nursing Education
Principles of Public Health Nursing I and II
Organization of School Nursing
Administration of Public Health
Teaching of Home Nursing and Child Care I and II
Home and Community Problems Caused by Tuberculosis
Supervision in Public Health Nursing
Observation and Practice in Public Health Nursing
Communicable Diseases and the Nurse
Administration of Clinic Services
Survey of Eye Conditions
Psychology of Childhood—Adolescence
The Living Organism

Nursing Education: (at Lake Sebago)
Survey of Physical Defects in Children
Practicum in Rehabilitation of Orthopedic Defects
Adaptation of Physical-Education Activities for the Atypical Individual

Northwestern University, Evanston and Chicago, Ill.

June 24–August 17

Teaching Rhythms to Children
Organization and Supervision of Health Programs

Advanced Kinesiology
Mental Hygiene in Teaching
Child Development
Sex Education in Social Work
Psychiatry for Social Workers

University of Pennsylvania, Philadelphia, Pa.

June 24–August 6

Nursing Education: Special Phases of Public Health Nursing
Physical Education: Principles of Health and Physical Education; Principles of Healthful Living

Rutgers University, New Brunswick, N. J.

July 1–August 9

Public Health Practice
Principles of Public Hygiene

Stanford University, Stanford University, Calif.

June 20–August 31

Physical Education and Hygiene

Smith College—School for Social Work, Northampton, Mass.

July 3–August 28

Medical Information

Springfield College, Springfield, Mass.

July 1–August 3

Materials and Methods in Health Education
Health and Physical Education for Atypical Children

Syracuse University, Syracuse, N. Y.

July 1–August 9

Principles of Public Health Nursing
Maternity and Child Hygiene
Special Fields in Public Health Nursing
Case Studies in Public Health Nursing
Preventable Diseases
Psychology (Child, Adolescent, Educational)
Nutrition
Hygiene Methods
Mental Hygiene

Temple University, Philadelphia, Pa. Teachers College — Department of Physical and Health Education

July–August

Personal and Community Hygiene
Supervision of Health Instruction
Orthopedics

University of Tennessee, Knoxville, Tenn.

June 10–July 17

Bacteriology
Child Development
Child Guidance
Education of Exceptional Children
Group Hygiene
Home Nursing
Human Physiology
Mental Hygiene (School)
Nutrition
Parasitology
Physical Education
Public Health Education
School Hygiene
Water Supply

July 18–August 23

Adolescent Psychology
Child Development
First Aid
Human Physiology
Nutrition
Personal Hygiene
Public Health Education
Water Supply

University of Utah, Salt Lake City, Utah

June 12–July 21

Biology
Chemical Research
Problems in Child Development
Guidance and Personnel in Secondary Schools
Physical Education and Hygiene
Home Economics
Social Work
Introduction to Public Health
Personal Health and Its Teaching
Principles of Child Welfare
The Child and the Curriculum
Activities in the Kindergarten
Social and Civic Functions of Education
Education in C.C.C.
Driver Education and Traffic Safety
Nutrition for Teachers
Advanced Course in Nutrition (Grad.)
American Social Problems
Principles of Social Psychology
Lipreading

Vassar College, Poughkeepsie, N. Y.

June 20–July 31

Institute of Euthenics:
Special Work in Guidance and Science (for secondary school teachers)
Child Development
Home Management

University of Virginia, University, Va.

June 17–July 27

Hygiene and Sanitation

Wagner College, Staten Island, N. Y.

June 10–July 20

Bacteriology
Applied Bacteriology
Serology
Clinical Pathology
Seminar in Medical Technology

Washington University, St. Louis, Mo.

June 17–July 26

Education
Natural Sciences
Psychology
Sociology and Social Work

University of Washington, Seattle, Wash.

June 17–July 17 (First Term)
July 18–August 16 (Second Term)

Diagnostic and Remedial Work in Education
Behavior as an Expression of Health
Nutrition for Public Health Nurses
Readings in Nutrition
Bacteriology
Organization, Administration, and Techniques in Special Fields of Public Health Nursing
Public Health Administration and Epidemiology
Principles of Teaching Nursing and Health
Methods of Supervision of Public Health Nursing
Methods and Materials in Health Teaching
School Health Program
Public Health Program

Wayne University, Detroit, Mich.

June 26–August 16

Measuring in Health Education
Materials and Methods of Safety Education
Problems of School Health
Problems in Summer Camp Work for Handicapped Children
Principles of Summer Camp Leadership
Individual Hygiene
Physiological Hygiene

University of West Virginia, Morgantown, W. Va.

June 12–August 26

First Term:
Problems in Health and Physical Education
Tests in Health and Physical Education
Advanced Public School Health
Seminar in Health and Physical Education

Second Term:
Problems in Health and Physical Education
Tests in Health and Physical Education
Seminar in Health and Physical Education

Western Reserve University—School of Nursing, Cleveland, Ohio

June 17–July 26

Public Health Nursing
Principles and Practices of Public Health Nursing
Principles of Orthopsychiatry

University of Wisconsin, Madison, Wis.

June 24–August 2

Curriculum in Physical Education for Junior and Senior High School Girls
First Aid and Safety Education
Health Education in Schools
Human Anatomy
Medical Bacteriology
Physical Examinations and Therapeutics
Play, Recreation and Leisure Time Problems
Physical Therapy
School Health and Hygiene
Therapeutic Gymnastics
Organization and Administration of a City Recreation Program
The Extra-curricular Physical Education Program in the Public Schools
Physical Education for Elementary and Secondary Schools
Recent Advances in Applied Physiology

ANNUAL MEETING OF PUBLIC HEALTH ASSOCIATION OF NEW YORK CITY

THE Fourth Annual Meeting of the Public Health Association of New York City took place on April 9, at the George Washington Hotel, New York.

Two well attended afternoon sessions were held, which were devoted to a discussion of engineering and health education. The dinner meeting was attended by 200 public health workers, and the speaker was Dr. Jay B. Nash, Professor of Education at New York University.

The following new officers were elected for the current year:

President—Arthur I. Blau, M.D.
1st Vice-President—Helen C. Manzer, Ph.D.
2nd Vice-President—Frank A. Calderone, M.D.
Secretary-Treasurer—Frank Kiernan
Representative on A.P.H.A. Governing Council—Hazel Corbin

NEW ENGLAND HEALTH EDUCATION INSTITUTE

THE New England Health Education Institute held its tenth session in Hartford, Conn., April 15–19. Among the sponsors were the six State Departments of Health of New England, the U. S. Public Health Service, the U. S. Children's Bureau, the New England Tuberculosis Association, and the departments teaching public health at Yale, Harvard, the Massachusetts Institute of Technology, and Simmons College. Also joining this year were the Connecticut State Medical Society, the State Nurses Association, and the Connecticut Public Health Association.

This was the tenth New England Health Institute. Begun in 1922 in Connecticut, it was then held in rotation in Massachusetts, Maine, New Hampshire, Rhode Island, and Vermont, the last meeting being held in Maine in 1931.

During the five days of the Institute, more than 500 persons registered and attended sessions organized under the 16 sections covering many different aspects of the public health field. The faculty included 120 persons, among whom the Section Chairmen were: John A. Ferrell, M.D., Wilson G. Smillie, M.D., Roscoe H. Suttie, C.E., Halbert L. Dunn, M.D., Eliott S. Robinson, M.D., R. A. Vonderlehr, M.D., R. R. Sayers, M.D., C. L. Larkin, M.D., Hugh B. Campbell, M.D., Martha M. Eliot, M.D., R. C. Hood, M.D., George R. Cowgill, Ph.D., Mary D. Forbes, R.N., Eugene Kahn, M.D., Clair E. Turner, Dr.P.H., and E. G. Woodward.

NEW YORK STATE MARRIAGES AND THE SYPHILIS LAW

IT has been announced by J. V. DePorte, Ph.D., Director of the Division of Vital Statistics of the New York State Department of Health, that in New York State exclusive of New York City more residents were married in 1939 than during the previous year, despite the stringent marriage laws and the requirement of the test for syphilis which became effective July 1, 1938.

A notable effect was the reduction of non-residents married in New York State who in 1939 totaled only 1,711 as compared with a peak of 23,521 in 1936. It is stated that the requirement for a syphilis examination impelled many New York couples to be married in other states during the first few months of the application of the law, but there is evidence that this movement has practically ceased.

TULAREMIA AND COTTONTAILS

PREVALENCE of tularemia or rabbit fever in Western states brought the second successive New York State ban on the importation of cottontail rabbits recently. The Conservation Department reports the disease at least as widespread as it was a year ago when foreign rabbits were first barred.

EIGHTH AMERICAN SCIENTIFIC CONGRESS

INVITATIONS have been extended to the governments of all American republics to participate in the 8th American Scientific Congress, to be held in Washington, May 10–18. The occasion will mark the foundation of the Pan American Union in 1890. Previous Scientific Congresses have been held beginning in 1898 at Buenos Aires, Montevideo 1901, Rio de Janeiro 1905, Santiago de Chile 1908, Washington 1915–1916, Lima 1924–1925, and Mexico City 1935.

Among the 8 sections which cover both theoretical and applied sciences, history, economics, and education, is Section V dealing with public health and medicine. Dr. Thomas Parran, Surgeon General of the U. S. Public Health Service, Washington, is the Chairman.

The announcement points out that the program for this Section has been prepared to include particular subjects of interest to all of the American republics, especially those fields in which significant progress has been made in recent years.

Among the subjects to be discussed under Section V are (1) nutrition, with special reference to pellagra and the application of available methods for determining the prevalence of nutritional defects; (2) tuberculosis, with special reference to the determination of its prevalence, including the use of tuberculin and the x-ray, and the advances in surgery in tuberculosis of the chest; (3) cancer, with special reference to etiological factors, organization of services which will make available the latest knowledge, the best practices in diagnosis and treatment, and the comparative usefulness of different sources of radiant energy; (4) chemotherapy, with special reference to the newer synthetic drugs in the treatment of gonorrhea, puerperal sepsis, venereal lymphogranuloma, and pneumonia; (5) diseases of the heart, with emphasis on acute rheumatic fever and syphilitic heart disease; (6) rehabilitation of physically handicapped children; (7) tropical and other diseases, with special reference to undulant fever, endemic typhus, tularemia, pneumonic plague, verruga, onchocerciasis, dysentery, pinto, and yellow fever.

Among those invited to attend are the official and institutional delegates from countries members of the Pan American Union and other members, including members of the various cooperating committees as appointed by the respective governments, honorary designates upon special invitation by the organizing committee, authors of papers, and individual participants.

STUDIES IN INFANTILE PARALYSIS

A DONATION of $13,800 from the National Foundation for Infantile Paralysis, Inc., has been made to the University of California to investigate the exact relationship between human infantile paralysis and equine encephalomyelitis. This will be undertaken at the Hooper Foundation for Medical Research on the San Francisco campus of the University.

NEW REPORT ON CASE FINDING PROCEDURES IN TUBERCULOSIS

THE Committee on Evaluation of Administrative Practices, one of the sub-groups of the Committee on Administrative Practice, has presented a report on Case Finding Procedures in Tuberculosis. This is the result of 2 years of study by a special group of clinicians and administrative leaders in tuberculosis control, and is presented as a provisional report in which the problem of case finding is analyzed, and conclusions and recommendations as to the relative merits of different procedures under specific circumstances are discussed.

The report is published by the National Tuberculosis Association and is distributed through affiliated state and local tuberculosis associations or through the Book Service of the American Public Health Association at 25 cents for single copies.

The Committee on Evaluation of Administrative Practices, of which Dr. Haven Emerson is Chairman, believes that this material is of value to health officers and those concerned with tuberculosis control, and has authorized the publication of this preliminary report as a manual on case finding, hoping to secure a still wider consideration of the problem. The committee welcomes criticisms and suggestions regarding the items dealt with in the manual.

Dr. Emerson points out that, in view of the considerable reduction in the general prevalence of tuberculosis during the last few decades, it is necessary to use new and varied case finding methods appropriate to the earliest practicable discovery of the disease. This is essential if we are to be successful in what may prove to be the ultimate "mopping up" process by which we shall relegate human as we have bovine tuberculosis to the category of diseases of only occasional and diminishing occurrence. Much effort and large sums of money have been spent upon various plans of tuberculosis case finding in recent years. Increased attention has been given to the systematic sampling of population groups to determine the incidence of clinically significant tuberculosis and of tuberculous infection. Because of the lack of standardization or comparability of procedures, materials, and diagnostic criteria, however, few basic conclusions of general application could be drawn from these experiences, and a critical study of tuberculosis case finding procedures seemed essential as an aid to public health administrators.

SOUTHERN CALIFORNIA PUBLIC HEALTH ASSOCIATION ELECTS OFFICERS

AT the annual meeting of the Southern California Public Health Association, held recently, the following officers were elected:

President—C. Morley Sellery, M.D.
President-Elect—Hyman I. Vener, M.D.
First Vice-President—Theodore D. Beckwith, Ph.D.
Second Vice-President—Roy O. Gilbert, M.D.
Secretary-Treasurer—Eunice Lamona, R.N.
Assistant Secretary-Treasurer—Floyd P. Wilcox, D.V.M.

CONNECTICUT PUBLIC HEALTH ASSOCIATION ELECTS NEW OFFICERS

AT the 1940 Annual Meeting of the Connecticut Public Health Association, held in Hartford on April 17, the following new officers were elected:

President—W. Bradford Walker, M.D., Cornwall
President-Elect—Richard O'B. Shea, M.D., Bridgeport
Vice-President—Paul H. Brown, M.D., Stamford
Secretary-Treasurer—Mario L. Palmieri, M.D., Middletown

RADIOACTIVE STANDARDS

THE National Research Council has announced that a series of radioactive standards is being prepared under the direction of its committee on this subject. The standards will be deposited in the National Bureau of Standards in Washington to be issued as working standards to investigators who desire them. At present the preparations are as follows: Radium Standards, Thorium Standards, and Standard Rock Samples. It is expected that these standards will provide all workers in this field with a common basis for comparison of measurements and will improve the accuracy of measurements of this type.

Communications may be addressed to the Chairman of the Committee, Pro-

fessor Robley D. Evans, Department of Physics, Massachusetts Institute of Technology, Cambridge.

NOMINATIONS FOR HALL OF FAME

NEW YORK University has announced that 143 men and women have been chosen so far as candidates for the 9th quinquennial election to the Hall of Fame for Great Americans on the campus of New York University. The names of these 143 historical figures, all of whom have been dead at least 25 years, now go to the Senate of New York University for seconding. Final election is by the 114 members of the College of Electors.

Among the names of those having relationships with medicine and public health in the nominations are the following:

Dr. William Beaumont (1785–1853), physician who first observed the process of digestion

Johns Hopkins (1795–1873), founder of Johns Hopkins University

Dr. Jesse W. Lazear (1866–1900), who participated in the fight against yellow fever.

Dr. Ephraim McDowell (1771–1830), surgeon who performed the first ovariotomy

Dr. Silas Weir Mitchell (1829–1914), pioneer in the application of psychology to medicine

Horace Wells (1815–1848), first used nitrous oxide gas as an anesthetic in dentistry.

STANDARD HIGHWAY SAFETY PROGRAM FOR STATES

THE Automotive Safety Foundation, of New York, N. Y., has announced a Standard Highway Safety Program for States which purports to be a working program to increase traffic efficiency and to reduce accidents.

The report covers legislation, motor vehicle administration, enforcement, engineering, education, training personnel, and research.

Copies may be obtained on application from the Foundation.

TUBERCULOSIS CONGRESS TO BE HELD IN ARGENTINA

THE Fifth Pan American Congress of Tuberculosis will be held in Buenos Aires and Cordoba, Argentina, October 13–17, under the presidency of Dr. Gumersindo Sayago, of Cordoba.

ARGENTINA'S SURGEON GENERAL VISITING THE UNITED STATES

DR. Miguel Susini, Director del Departmento Nacional de Higiene of Argentina, is visiting the United States. After conferences with Surgeon General Thomas Parran in Washington, he will visit outstanding hospitals and medical schools.

PUERTO RICO HOME FOR CHILDREN OPENED

THE Department of Health of Puerto Rico inaugurated its Rafael Martinez Nadal Insular Home for Children at Guaynabo, March 3.

The new school, which accommodates about 400 children, has modern vocational education facilities.

NEW DOCUMENTARY FILMS

THE film "Choose to Live," produced by the U. S. Public Health Service and the American Society for the Control of Cancer to aid in the campaign against cancer, was previewed in Washington recently. Designed for lay audiences, the picture tells the story of one woman's encounter with cancer and presents educational information on the subject. The actors are professional, and the hospital and laboratory scenes were taken at Memorial Hospital, New York, Marine Hospital, Baltimore, and the National Cancer Institute, Bethesda, Md., to assure medical accuracy.

The initial showings of Pare Lorentz's "The Fight for Life," a maternity film, produced by the United States Film Service, brought both acclaim and criticism to the director and the pro-

ducers. There is apparently favorable agreement concerning technic, photography, and the fact that it teaches the lesson for which it was planned—there are too many unnecessary deaths in childbirth. Scientists, however, appear to be divided in their prognostications of the effect of the film upon prospective mothers. The Maternity Center Association has been vocal in deploring its depressing characteristics and its probable inculcation of fear.

MISSOURI ESTABLISHES NEW HEALTH UNITS

FULL-time health units were recently established in Jasper and Pemiscot Counties, bringing to a total of 8 the number of counties with units subsidized in part by funds from the Missouri State Board of Health. Webb City is headquarters for the Jasper County unit, and Caruthersville for Pemiscot County.

HARBEN GOLD MEDAL

THE Harben Gold Medal of the Royal Institute of Public Health and Hygiene, London, has been awarded to Sir Leonard Hill, Professor of Physiology at the Hospital of the University of London. The Smith award has also been conferred on Sir William Savage, recently Medical Officer of Health, Somerset.

SEDGWICK MEMORIAL LECTURE

THE Sedgwick Memorial Lecture, combined with the Delta Omega Lecture for Gamma chapter, was given this year by Dr. Thomas Parran, Surgeon General of the U. S. Public Health Service, on April 11, at the Massachusetts Institute of Technology, Cambridge, Mass.

CHARLES R. COX RECEIVES THE FULLER AWARD

IT has been announced by New York State *Health News* that Charles R. Cox, Chief of the Bureau of Water Supply, New York State Department of Health, has been chosen by the Committee of the American Water Works Association to receive the 1939 national award to the New York section in recognition of his services in the sanitation of water supplies. The certificate was presented during the general convention of the Association held in Kansas City in April.

PERSONALS

Central States

BENEDICT B. BACKLEY, M.D., of Jacksonville, Ohio, has been named Health Commissioner of the new combined Athens City and County Health Unit.

DR. CHARLES J. HEDLUND, formerly of Atwater, Minn., has been appointed Health Officer of a new health unit in Baker County, Ore.

DAVID D. HOLADAY, M.D., formerly of Osage City, has been appointed full-time Health Officer of Marion County, Kans.

R. G. MOSSMAN, M.D., has been appointed Commissioner of Health of Youngstown, Ohio.

DR. FRANCIS R. NEFF, of London, has been named Health Commissioner of Madison County, Ohio, succeeding the late DR. R. S. TRIMBLE.

DR. RICHARD F. RICHIE, formerly of Lincoln, Neb., has been appointed Assistant Director of the division in charge of the children's unit of the Mental Hygiene Division of the North Carolina State Board of Charities and Public Welfare.

JOSEPH W. SPEARING, M.D.,† formerly of Cimarron, Kans., has been appointed Health Officer of Cherokee County, with offices in Columbus.

DR. WILLIAM L. STRUNK, head of the Student Health Service at St. Olaf College, Northfield, Minn., has been

* Fellow A.P.H.A.
† Member A.P.H.A.

appointed Conservation Commissioner for the State of Minnesota, with leave of absence from St. Olaf College.

Eastern States

FRANKLYN B. AMOS, M.D.,† District Health Officer in charge of the Amsterdam District Office of the New York State Department of Health, has been made Assistant Director, Local Health Administration, with headquarters in Albany.

BERNARD M. BLUM, M.D., M.P.H.,* Assistant District Health Officer of the New York State Department of Health, on the staff of the Buffalo District Office, has been transferred to the position of Epidemiologist on the staff of the Division of Communicable Diseases, with headquarters in Albany.

HELENE BUKER, M.A., R.N.,† formerly Director of Nurses in the Cattaraugus County Department of Health, Olean, N. Y., has been appointed Assistant Director of the Bureau of Public Health Nursing, Michigan Department of Health.

JOHN W. M. BUNKER, PH.D.,* Professor of Biochemistry and Physiology and Director of the Research Laboratories of Biology at the Massachusetts Institute of Technology, has been appointed Dean of the Graduate School.

REEVE B. HOWLAND, M.D.,† has recently resigned from his position as Health Officer of Elmira, N. Y.

ROBERT C. HUME, M.D., M.P.H.,† who has been on the staff of the Cattaraugus County Health Department, Olean, N. Y., has been appointed an Assistant District State Health Officer of the New York State Department of Health.

W. L. J. MCDONALD, M.D.,† formerly Assistant District Health Officer of the New York State Department of Health, at the Glens Falls office, has been appointed Commissioner of Health of the Columbia County Department of Health, Hudson, N. Y. Dr. McDonald succeeds LOUIS A. VAN HOESEN, M.D.,† who retired January 1, 1940.

HARRY S. MUSTARD, M.D.,* Professor of Preventive Medicine at the New York University College of Medicine, has been appointed Director of the DeLamar Institute of Public Health, Columbia University, New York, N. Y. Dr. Mustard will also succeed DR. HAVEN EMERSON * as Professor of Public Health Practice. Dr. Emerson will retire July 1, after 19 years as a member of the Columbia faculty.

ERNEST L. STEBBINS, M.D., C.P.H.,* Albany, N. Y., Assistant Commissioner for Preventable Diseases of the New York State Department of Health, has been named Professor of Epidemiology at the DeLamar Institute of Public Health, Columbia University, New York, N. Y.

EDMUND C. VAN DUSEN, M.D., Health Officer of Athens, N. Y., has resigned.

DR. JAMES WATSON, recently a member of the staff of the Worcester State Hospital, Worcester, Mass., has been appointed Director of the Mental Hygiene Division of the North Carolina State Board of Charities and Public Welfare.

CHARLES F. WILINSKY, M.D.,* Director of Beth Israel Hospital, Boston, Mass., and Deputy Commissioner of Health in the Boston Department of Health, has been elected President of the New England Hospital Association for the coming year.

Southern States

DR. CLAYTON A. ADAMS, JR., formerly of Trenton, has been appointed

* Fellow A.P.H.A.
† Member A.P.H.A.

Health Director of Jackson County, with headquarters in Marianna, Fla.

GEORGE M. ANDERSON, M.D.,† of Eastman, Ga., has resigned as Commissioner of Health of Dodge County.

JOHN M. DAVID,† formerly Public Health Engineer, Bulloch County, Statesboro, Ga., has accepted appointment as Regional Public Health Engineer, Georgia Department of Public Health, at Swainsboro, Ga.

DR. ABRAM J. DAVIS, of Waynesboro, Ga., formerly Commissioner of Health of Burke County, has been appointed Regional Medical Director of the East Central Health Region of the State of Georgia. He will be succeeded by DR. WILBUR D. LUNDQUIST, formerly of Lodi, Calif.

JOHN W. FERTIG, PH.D., Associate in Biostatistics in the School of Hygiene and Public Health of Johns Hopkins University, Baltimore, Md., has been named Professor of Biostatistics at the DeLamar Institute of Public Health, Columbia University, New York, N. Y.

DR. HENRY C. FRECH, JR., of Savannah, Ga., has been appointed Assistant Director of Maternal Hygiene at the Chatham-Savannah Health Department.

OSCAR DAVID GARVIN, M.D.,† of Lancaster, S. C., recently Health Officer of Lancaster County, has been appointed Health Officer of Spartanburg County, to succeed DR. HILLA SHERIFF.†

DR. OSCAR EMERSON HAM, of Atlanta, Ga., has been appointed Commissioner of Health of Bartow County.

DR. RUSKIN KING, of Savannah, Ga., has been appointed Assistant Director of Infant Hygiene at the Chatham-Savannah Health Department.

DR. ROBERT J. LAMB, formerly of Jacksonville, has been appointed Health Officer of Franklin and Gulf Counties, succeeding DR. DERRIC C. PARMENTER. His headquarters will be in Apalachicola, Fla.

DR. JOHN F. SIMMONS, of Greenville, S. C., has been appointed Health Officer of Georgetown County.

DR. CHARLES R. SMITH, of Morgan, Ga., has been appointed Commissioner of Health in Calhoun County.

JAMES A. THRASH, M.D.,† of Columbus, Ga., has been appointed in charge of a combined city-county Health Department established in Columbus, and Muscogee County.

Western States

ERNEST L. BERRY, M.D.,† of Buhl, Ida., has been appointed Idaho State Director of Health. He succeeds DR. HOWARD L. MCMARTIN, of Boise, who has been Acting Director.

DR. WILBUR D. LUNDQUIST, formerly of Lodi, Calif., who recently completed a course of training in public health administration, has been appointed by the Georgia State Department of Public Health as Commissioner of Health of Burke County to succeed DR. ABRAM J. DAVIS, of Waynesboro.

DEATHS

F. E. AYERS, M.D., for 21 years Commissioner of Health of Mercer County, Ohio, died February 23, at the age of 63.

PLATT WALKER COVINGTON, M.D., M.P.H.,* of Salt Lake City, Utah, director in the western states of the work of the International Health Division, Rockefeller Foundation, and former President of the Western Branch of the American Public Health Association, died in Baltimore, Md., April 20, after an illness of several months, at the age of 55.

* Fellow A.P.H.A.
† Member A.P.H.A.

CONFERENCES AND DATES

American Association for Adult Education—15th Annual Meeting. Hotel Astor, New York, N. Y. May 20–23.

American Association of Industrial Physicians and Surgeons—25th Annual Meeting. With First Annual Meeting of American Industrial Hygiene Association. Hotel Pennsylvania, New York, N. Y. June 4–7.

American Association of Public Health Dentists. Cleveland, Ohio. September 8–9.

American Association of Social Workers (Delegate Conference). Grand Rapids, Mich. May 24–25.

American Association of the History of Medicine. Atlantic City, N. J. May 4–5.

American Dental Association. Cleveland, Ohio. September 9–13.

American Dietetic Association — 23rd Annual Meeting. Pennsylvania Hotel, New York, N. Y. October 21–24.

American Heart Association. Scientific Meeting. Hotel Roosevelt, New York, N. Y. June 7–8.

American Home Economics Association —33rd Annual Meeting. Cleveland, Ohio. June 23–27.

American Hospital Association. Boston, Mass. September 16–20.

American Library Association. Cincinnati, Ohio. May 26–June 1.

American Medical Association — 91st Annual Meeting. Waldorf-Astoria Hotel, New York, N. Y. June 10–14.

American Nurses' Association. National Biennial Nursing Convention. Bellevue-Stratford Hotel, Philadelphia, Pa. May 11–18.

American Pediatric Society. Skytop, Pa. May 2–4.

American Public Health Association —69th Annual Meeting. Book-Cadillac Hotel, Statler Hotel, Detroit, Mich. October 8–11.

American Scientific Congress—8th. In connection with celebration of 50th Anniversary of founding of the Pan American Union. (First Section meeting, May 13.) Washington, D. C. May 10–18.

American Society of Civil Engineers. Summer Meeting. Denver, Colo. July 24–26.

American Society of Planning Officials. National Conference on Planning, in coöperation with American Institute of Planners, American Planning and Civic Association, and National Economic and Social Planning Association. San Francisco, Calif. July 8–11.

American Water Works Association—
Ohio Section — Mayflower Hotel, Akron, Ohio. May 9–10.
Pacific Northwest Section—Portland Hotel, Portland, Ore. May 9–11.
Florida Section — Seminole Hotel, Jacksonville, Fla. May 16–18.
Illinois Section—Congress Hotel, Chicago, Ill. May 22–24.
New York Section — Ithaca Hotel, Ithaca, N. Y. June 6–7.
Michigan Section — University of Michigan Union, Ann Arbor, Mich. September 11–13.
Rocky Mountain Section—Denver, Colo. September 16–17.
Western Pennsylvania Section — Castleton Hotel, New Castle, Pa. September 18–20.
Southwest Section — Mayo Hotel, Tulsa, Okla. October 14–17.
New Jersey Section—Atlantic City, N. J. October 18–19.
Kentucky-Tennessee Section — Lafayette Hotel, Lexington, Ky. October 21–23.

California Section—Los Angeles Biltmore Hotel, Los Angeles, Calif. October 23–26.

Minnesota Section—St. Paul Hotel, St. Paul, Minn. November 7–8.

Association of American Medical Colleges. Ann Arbor, Mich. October 28–30.

Association of American Physicians. Atlantic City, N. J. May 7–8.

Building Officials Conference of America. St. Louis, Mo. June 3–6.

Canadian Public Health Association—29th Annual Meeting. Winnipeg, Man. September 23–28.

Central Atlantic States Association of Dairy, Food and Drug Officials—Annual Conference. Hotel Raleigh, Washington, D. C. May 16–17.

Citizens' Conference on Government Management. University of Denver. Estes Park, Colo. June 17–22.

Civil Service Assembly. Central Regional Conference, Chicago, Ill., May 15–17. Western Regional Conference, Portland, Ore., June 24–26. Eastern Regional Conference, June.

Conference of State and Provincial Health Authorities of North America. Washington, D. C., May 7–8. (May 11, at National Institute of Health.)

Conference on Health and Physical Education. University of Denver, Denver, Colo. June 24–26.

Convention for the Revision of the Pharmacopoeia of the United States. Washington, D. C. May 14.

Dairy Industries Supply Association. Atlantic City, N. J. October 21–26.

Florida Public Health Association. Tampa, Fla. December.

Health Officers and Public Health Nurses—Annual Conference. Under the Auspices of the New York State Department of Health. Saratoga Springs, N. Y. June 24–27.

Indiana State Medical Association. French Lick Springs Hotel, French Lick, Ind. October 29–31.

Institute of Food Technologists—First Meeting. Morrison Hotel, Chicago, Ill. June 17–19.

Institute of Government. University of Southern California, Los Angeles, Calif. June 10–14.

Institute on Maternal and Infant Hygiene—for registered nurses. University of California, Berkeley, Calif. July 1–20.

International Association of Milk Sanitarians. Joint Meeting with the New York State Association of Dairy and Milk Inspectors. Hotel Pennsylvania, New York, N. Y. October 17–19.

International Association of Public Employment Services. Kansas City, Mo. May 14–17.

International Congress on Rheumatism—7th. New York, Boston, and Philadelphia. June 1–10.

Interstate Post-Graduate Medical Assembly. Cleveland, Ohio. October 13–19.

Maryland State Department of Health—20th Annual Health Conference, for field and departmental staffs. Baltimore, Md. May 3.

Medical Library Association — 42nd Annual Meeting. University of Oregon Medical School, Portland, Ore. June 25–27.

Medical Society of the State of New York. New York, N. Y. May 6–8.

Michigan Public Health Association. Detroit, Mich. October 8–11.

Missouri Public Health Association—Annual Meeting. Jefferson City, Mo. May 23–25.

Mother's Day. May 12. Tenth annual nation-wide campaign to make maternity safe—Maternity Center Association, New York.

National Association of Coroners. Hotel Adelphia, Philadelphia, Pa. August 26–28.

National Association of Housing Officials. William Penn Hotel, Pittsburgh, Pa. May 13–14.

National Association of Purchasing Agents—Governmental Group. Cincinnati, Ohio. June 3–6.

National Biennial Nursing Convention. Bellevue-Stratford Hotel, Philadelphia, Pa. May 11–18.

National Conference of Social Work. Grand Rapids, Mich. May 26–June 1.

National Conference on State Parks. Starved Rock, Ill., to Spring Mill, Ind. May 13–15.

National Council of State Public Assistance and Welfare Directors. Chicago, Ill. May 24–25.

National Education Association. Milwaukee, Wis. June 30–July 4.

National Fire Protection Association. Atlantic City, N. J. May 8–11.

National League of Nursing Education. National Biennial Nursing Convention. Bellevue-Stratford Hotel, Philadelphia, Pa. May 11–18.

National Organization for Public Health Nursing. National Biennial Nursing Convention. Bellevue-Stratford Hotel, Philadelphia, Pa. May 11–18.

National Posture Week. May 6–11.

National Restaurant Association. Chicago, Ill. October 7–11.

National Safety Council. Chicago, Ill. October 7–11.

National Tuberculosis Association. Hotel Statler, Cleveland, Ohio. June 3–6.

New Mexico Public Health Association. Albuquerque, N. M. May.

New York State Association of Public Health Laboratories — 24th Annual Meeting. School of Medicine and Dentistry, University of Rochester, Rochester, N. Y. May 20.

New York State Conference of Mayors and Other Municipal Officials. Rochester, N. Y. June 10–12.

North Carolina Public Health Association. Pinehurst, N. C. May 13.

Ohio Federation of Public Health Officials. Columbus, Ohio. May 24.

Pan American Sanitary Conference—Joint Session with Conference of State and Provincial Health Authorities of North America. Washington, D. C. May 8.

Pennsylvania Public Health Association. Philadelphia, Pa. May 23.

Schoolmen's Conference—on "Facing Youth Problems." New Jersey State Teachers College, Montclair, N. J. July 11–12.

Smoke Prevention Association — 34th Annual Convention. Hotel Statler, St. Louis, Mo. May 21–24.

Society of American Bacteriologists. St. Louis, Mo. December.

South Carolina Public Health Association. Myrtle Beach, S. C. May 27–30.

Special Libraries Association. Claypool Hotel, Indianapolis, Ind. June 3–6.

State and Provincial Health Authorities of North America. Washington, D. C., May 7–8. (May 11, at National Institute of Health.)

Symposium on Clinical Experience in Nursing. Catholic University of America, Washington, D. C. June 26–27.

Texas Public Health Association. Fort Worth, Tex. September 30–October 2.

Tri-State Conference of Food and Health Officials. Pittsburgh, Pa. October.

Western Branch, American Public Health Association — 11th Annual Meeting. Denver, Colo. June 24–27.

CORRECTION

WE regret a typographical error in The National Drug Company's advertisement in the March issue. The word "Petronal" was unfortunately substituted for "National." The corrected advertisement is being run on page XIII of this issue.

Best Sellers in the Book Service for April

Handbook of Public Health Bacteriology and Chemistry. 2d ed. Department of Public Health, San Francisco	$1.50
Approved Laboratory Technic. 2d ed. John A. Kolmer and Fred Boerner	8.00
Public Health Law—James A. Tobey	3.50
Getting Ready To Be a Father—Hazel Corbin	1.25
Supervision in Public Health Nursing—Violet H. Hodgson	2.50
Preventive Medicine and Hygiene—Milton J. Rosenau	10.00
The Control of Communicable Diseases—American Public Health Association	.30

Order from the Book Service
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Be Sure to Attend

The Business Meeting of the N.O.P.H.N.
At the Biennial Convention
Philadelphia, Pa., May 12-18

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